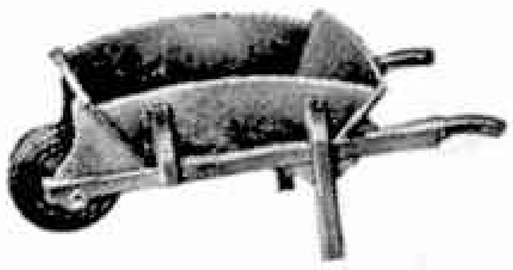
VOL. XXXIV. No. 8 AUGUST 1949

MECCANO MAGAZINE

ROYAL ALBERT BRIDGE

DINKY TOYS



Wheelbarrow
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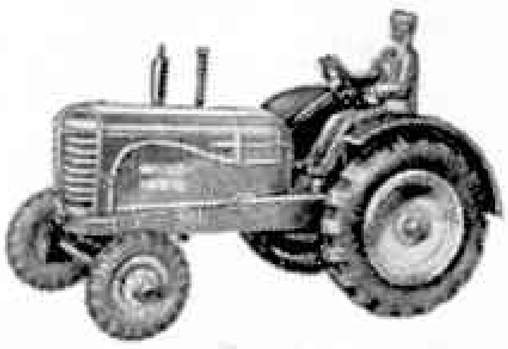
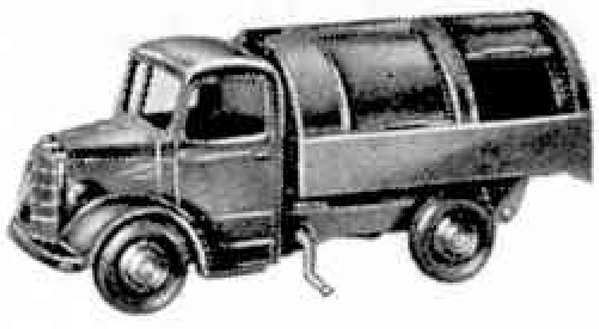


Massey-Harris Tractor
No. 27a
Price **3/2** each (including tax)



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No. 25v
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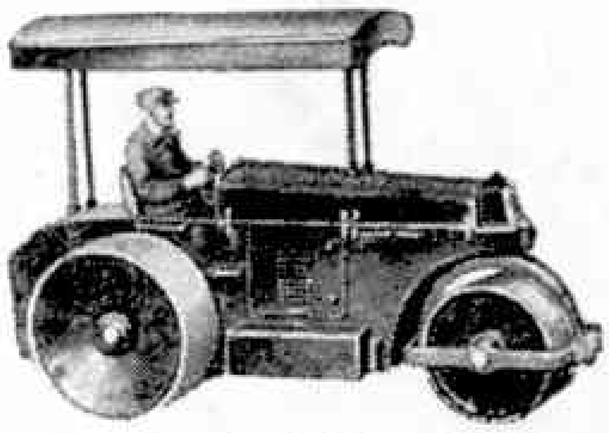
Price **4/9** each (including tax)

The Standard "Vanguard" Saloon, No. 40e
Price **1/9** each (including tax)



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"Fordor" Sedan
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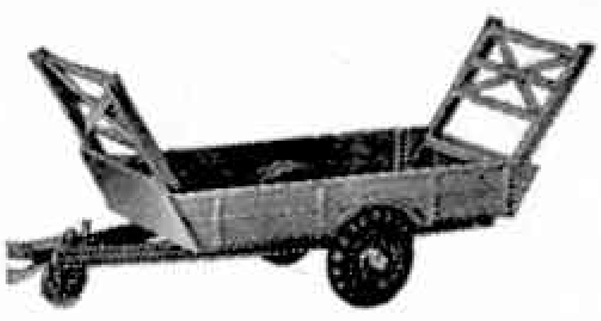

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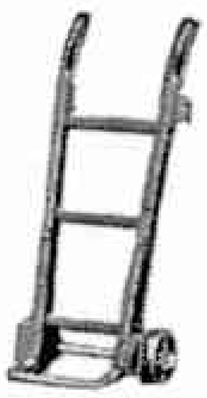
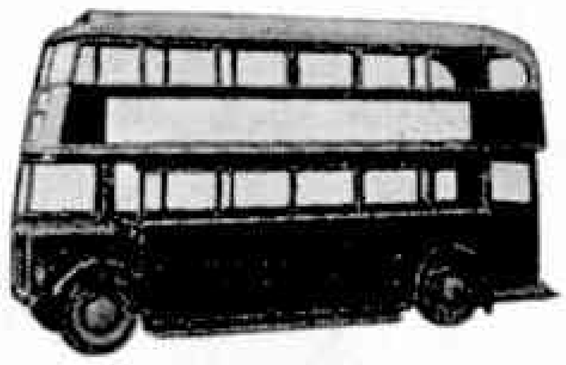


Sack Truck
No. 107a
Price **9d.** each (including tax)

4-wheel Hand Truck
No. 105c
Price **1/11** each (including tax)



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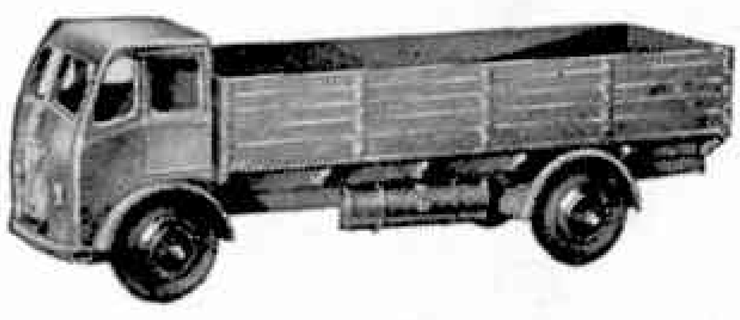

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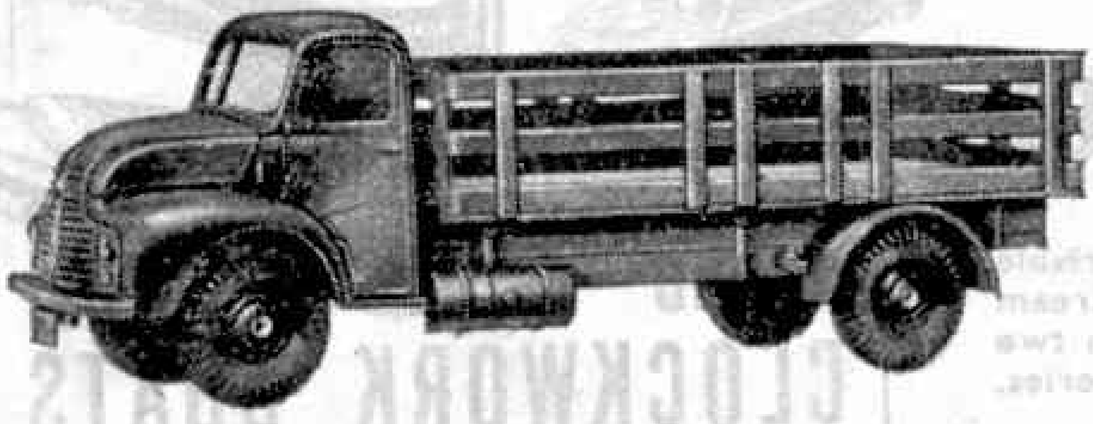

Dinky Supertoys No. 531
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Dinky Supertoys
No. 751
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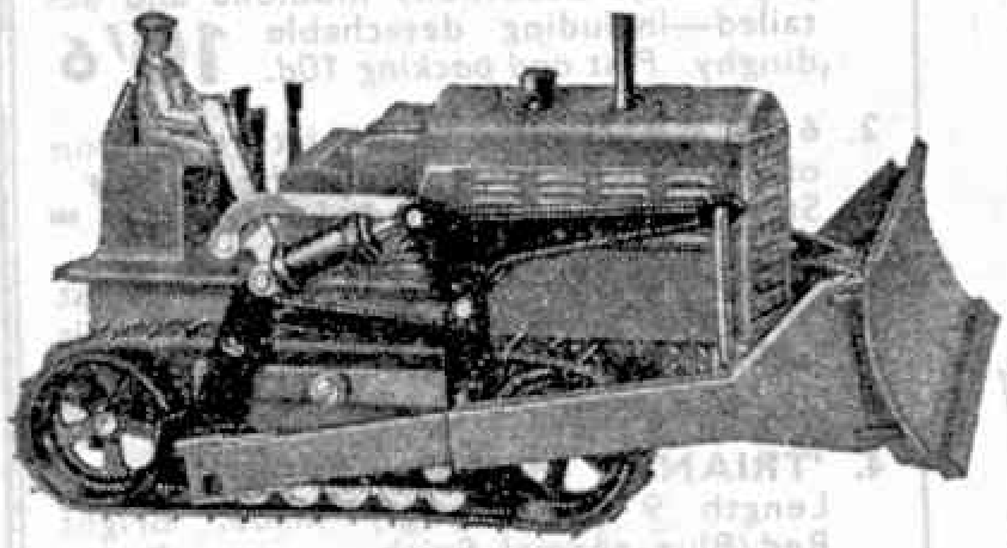

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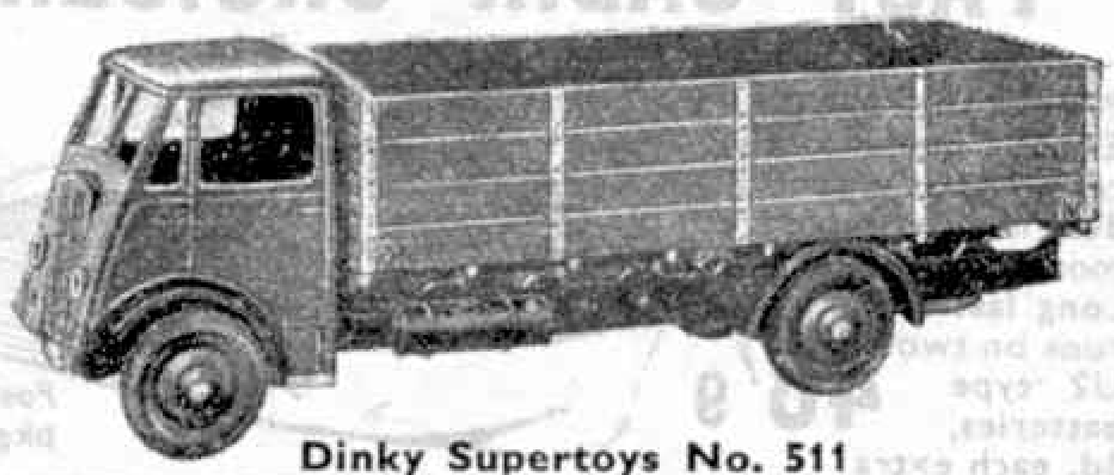

Dinky Supertoys No. 511
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Dinky Supertoys No. 562 Dumper Truck
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Foden 14-ton Tanker
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Bedford Articulated Lorry
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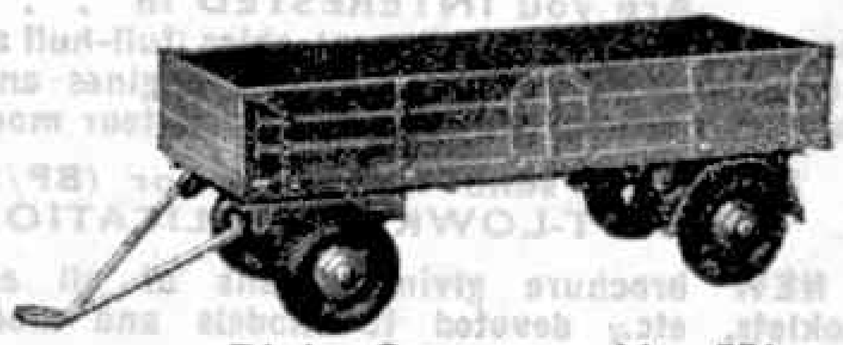

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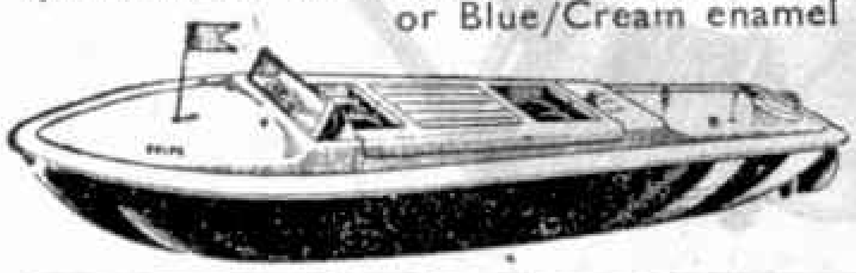

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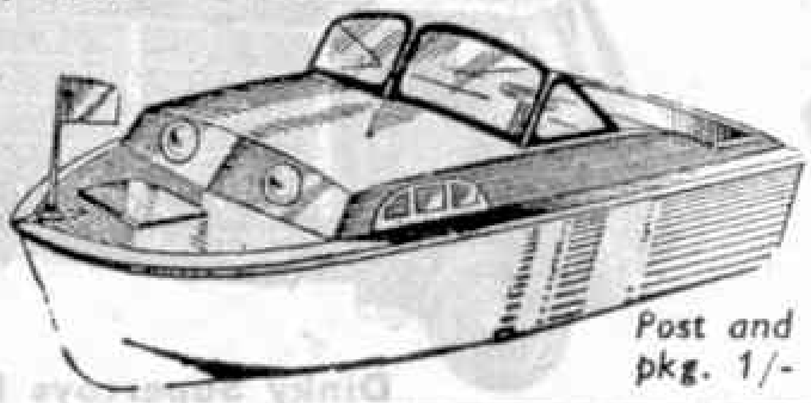

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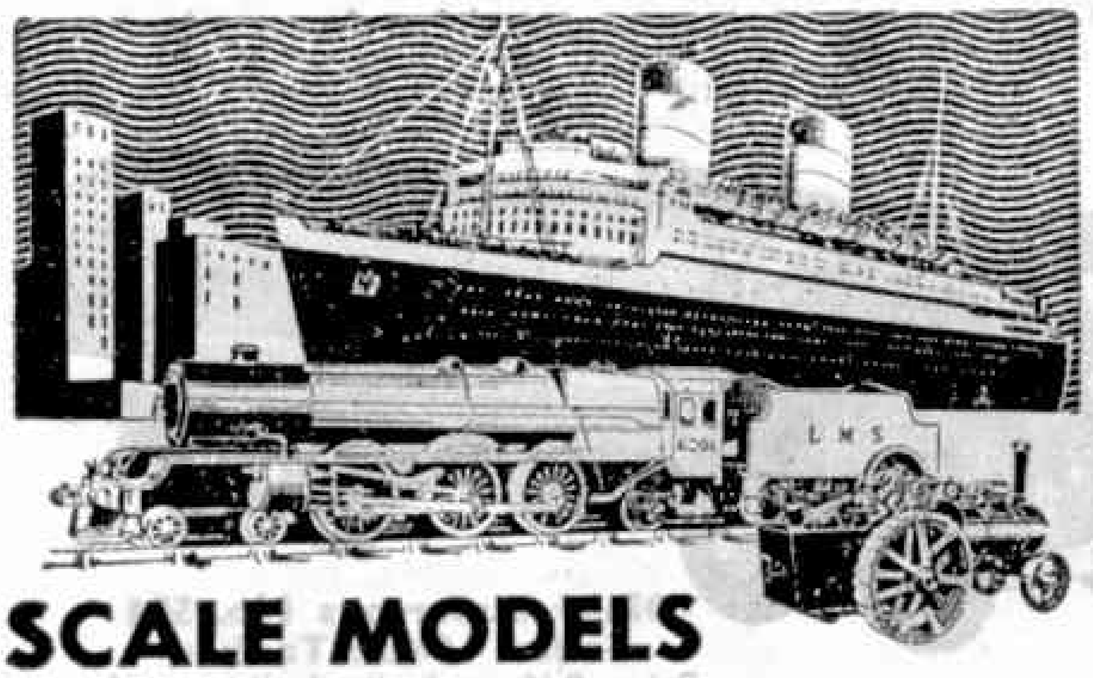

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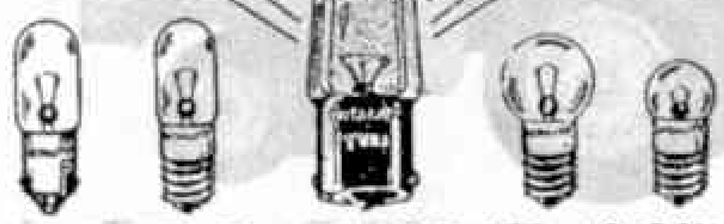

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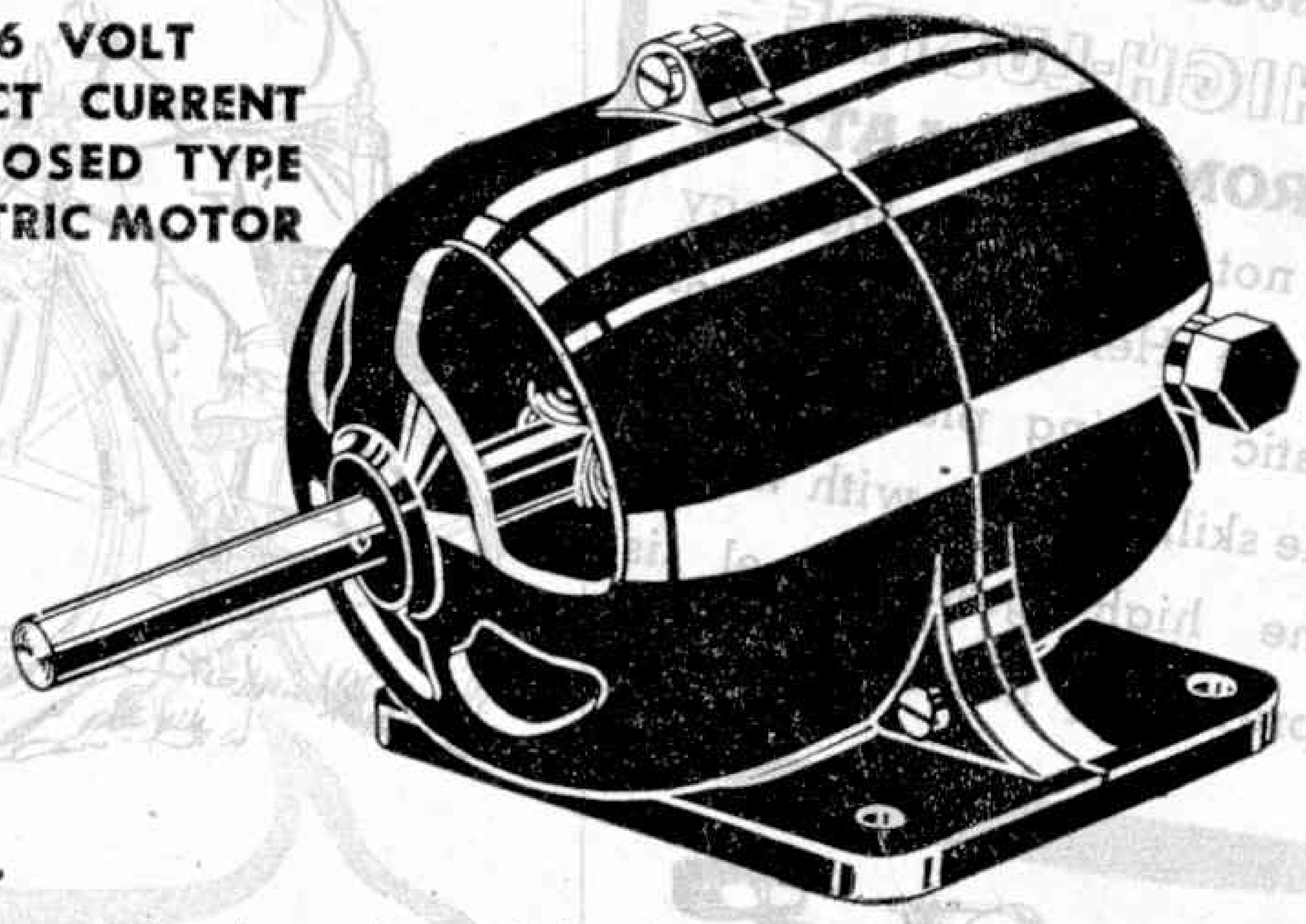

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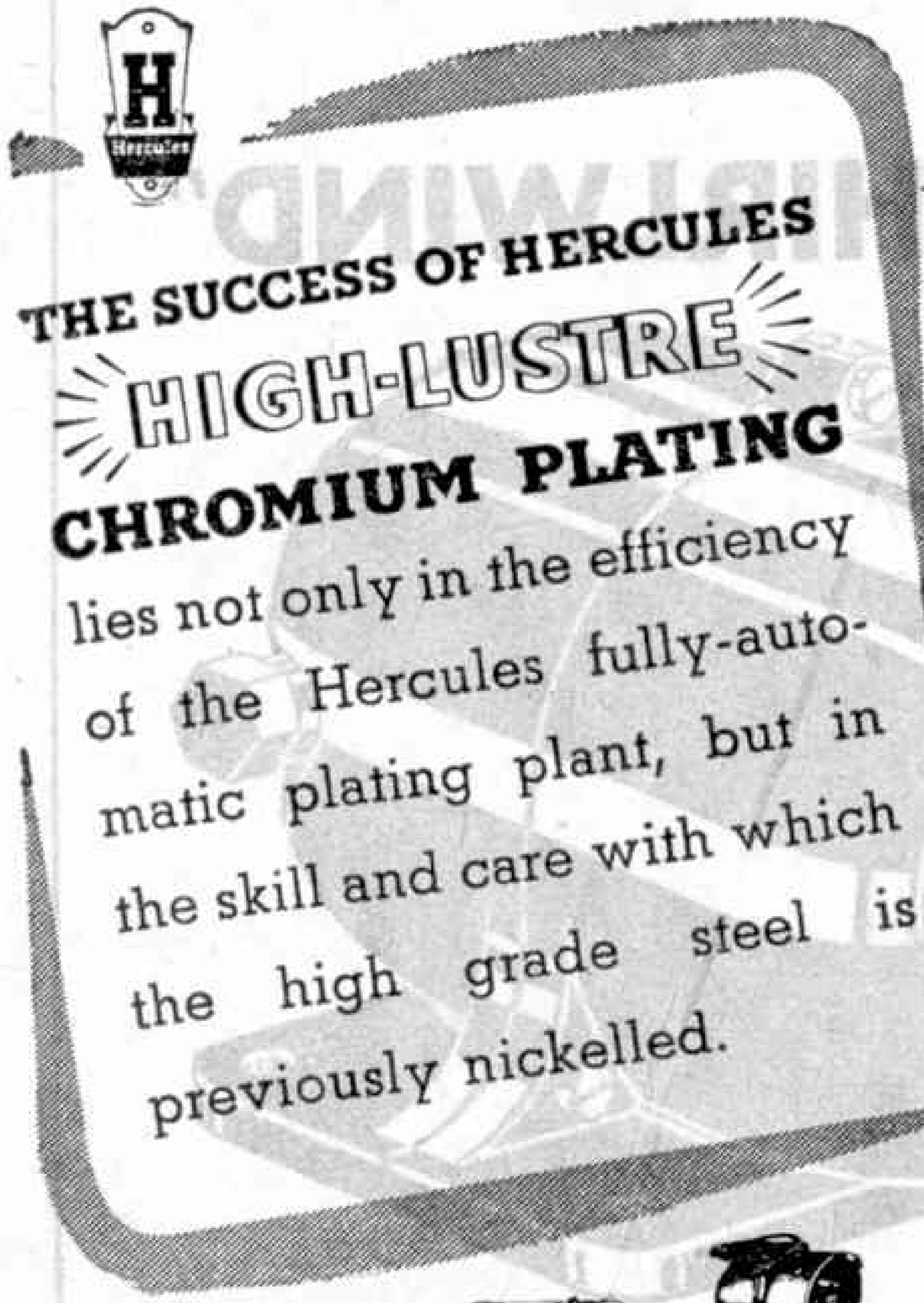

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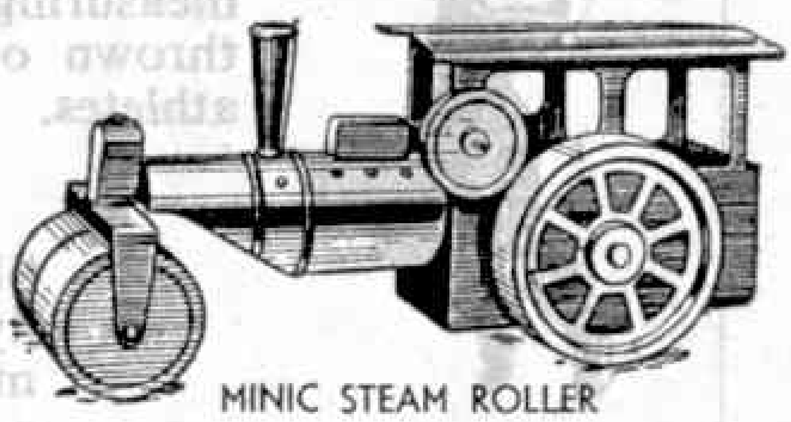

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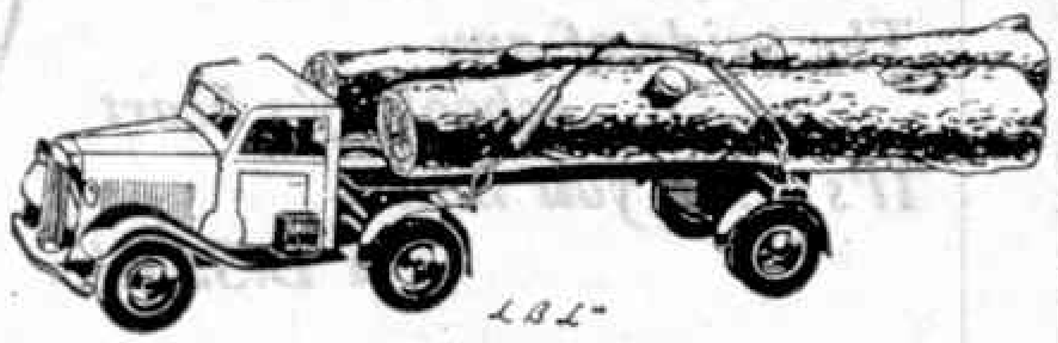

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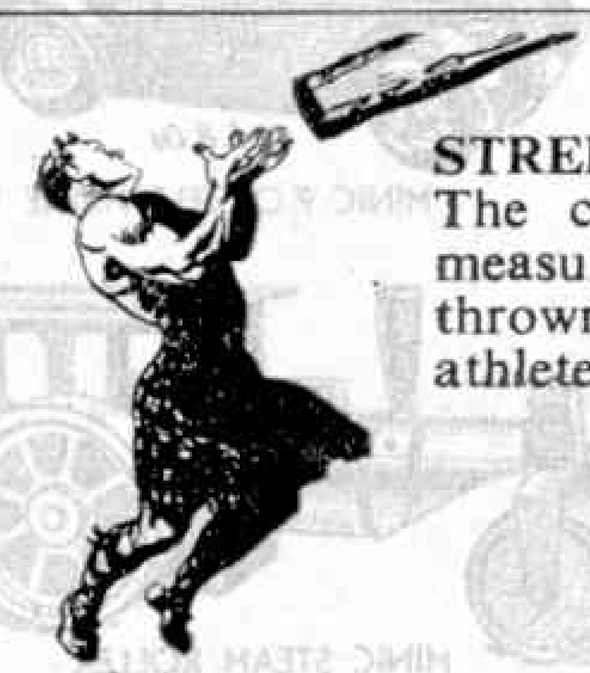

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Next Month: "THE STORY OF THE LIGHTSHIP." By Frank C. Bowen

MECCANO MAGAZINE

Editorial Office:
Binns Road
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England

Vol. XXXIV
No. 8
August 1949

With the Editor

Electric Locomotive Types

The splendid article on page 304 of this issue will be read with interest by all "*M.M.*" readers who are keen on electric locomotives and trains. Although the electric train lacks the external appeal of the steam train, it has a special interest of its own, whether it is of the familiar multiple-unit or motor-coach type, or is hauled by a separate locomotive.

The electric locomotive, although commonly used overseas, is not yet typical of the British railway scene, but there have been various examples at work for many years in this country. The double-bogie engines of the London Transport Metropolitan line occur to mind; and at last one of the modern Southern Region Electric locomotives has begun regular main line passenger working.

Some readers of the article may be puzzled by reference to electric locomotives of the 1–Co+Co–1 and the 2–Do–2 types. These unfamiliar descriptions are based on a special system that has been devised for electric locomotives, which cannot be correctly dealt with in the same simple way as steam locomotives. An electric locomotive may have a separate driving motor for each axle, or alternatively certain axles only may be driven, the others being simply carrying axles.

In the special electric system letters describing the total of driving axles replace the figures of the system usually used for steam types. Thus "A" stands for a single driving axle, "B" means two driving axles coupled together, "C" means three axles coupled, and "D" four. If each axle has its own motor, and the wheels therefore are not coupled, an "o" is used after the letter. Any carrying axles in front or in rear of the driving axles are referred to by number.

In this country all electric locomotives have separately driven axles. Thus the big Southern Electric locomotives, which have two six-wheeled bogies with all axles driven separately, are referred to as "Co+Co." A double-bogie eight-wheeled engine like the Metropolitans already referred to, having each axle of each bogie directly driven, is described as "Bo+Bo." In many foreign countries, however, there are electric locomotives of both the separately-driven axle and the coupled axle types, with or without front and rear carrying axles. A typical Swiss electric locomotive with eight coupled wheels, leading four-wheeled bogie and a trailing two-wheeled truck, would be described as a "2–D–1."

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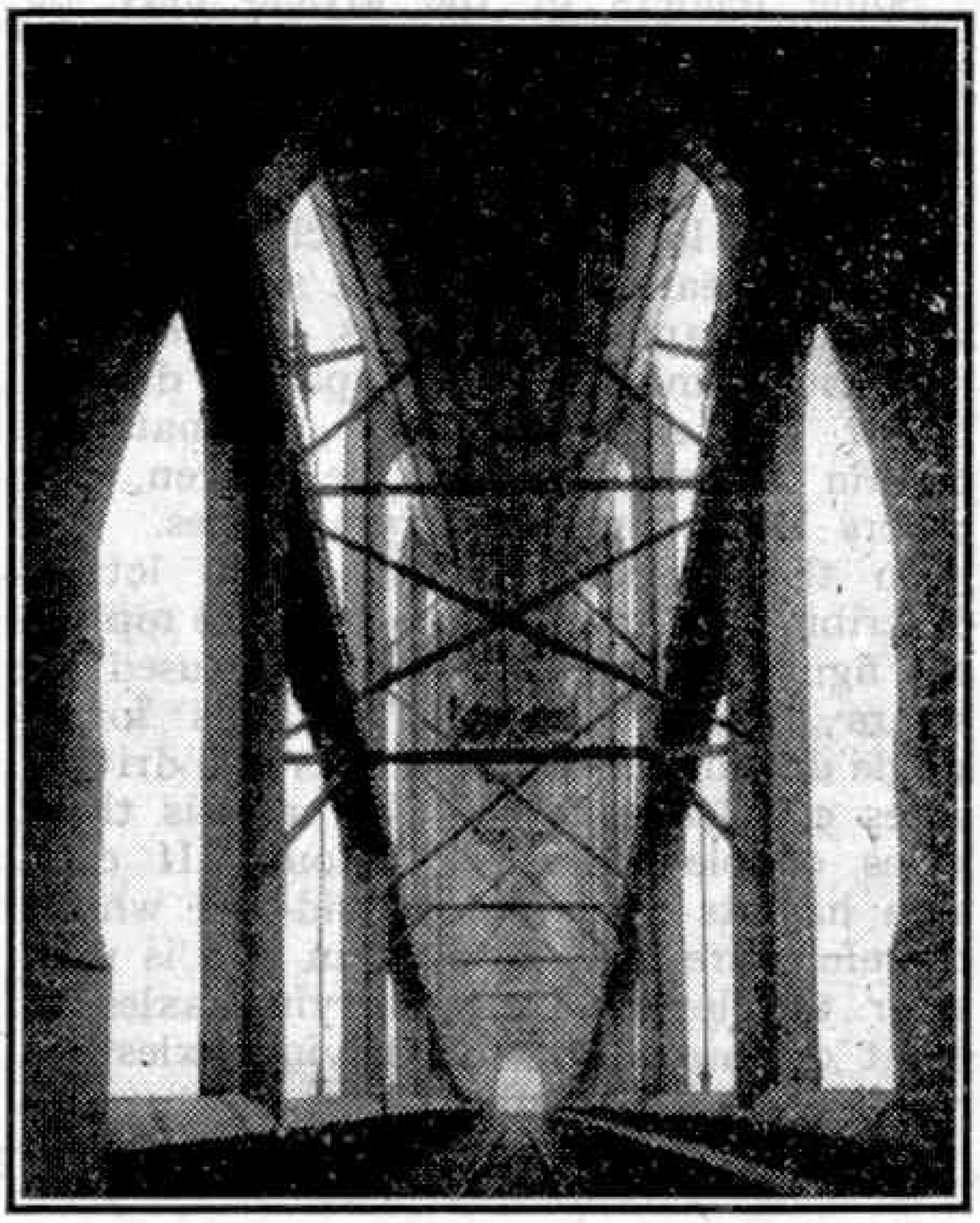
Royal Albert Bridge, Saltash

Brunel's Masterpiece

ROYAL Albert Bridge, spanning the Tamar to link Devon with Cornwall, and brought into use 90 years ago this year, is usually acclaimed as the masterpiece of Isambard Kingdom Brunel, the first Engineer of the Great Western Railway. Brunel conceived projects boldly on a grand scale and he had a flair for the unusual and artistic in design. This does not mean that his works were brilliant rather than lasting; Royal Albert Bridge is ample evidence of this. The "Kings" alone excepted, it can still be used by the most modern engines that Swindon has produced, while the weights of the rolling stock using the structure have considerably increased. It remains the only single-line stretch of railway on the route from Paddington to Penzance.

Royal Albert Bridge is a notable example of practical utility and engineering skill combined with imaginative treatment in design. The bridge not only does its job to-day, as it has for the past 90 years, but it looks well in its beautiful setting. Its seemingly delicate lines suit the scenery flanking each bank of the broad Tamar. It was Brunel's last great work and it carries the following inscription in bold letters cut into the portals: "*I. K. Brunel, Engineer, 1859.*"

The necessity for bridging the Tamar arose in the course of the extension of what became the railway empire of Paddington into the far west. After several schemes had to be rejected, Brunel finally decided to employ two main spans each of 455 ft. with a central pier and the necessary approach spans. The 70 ft. of Tamar

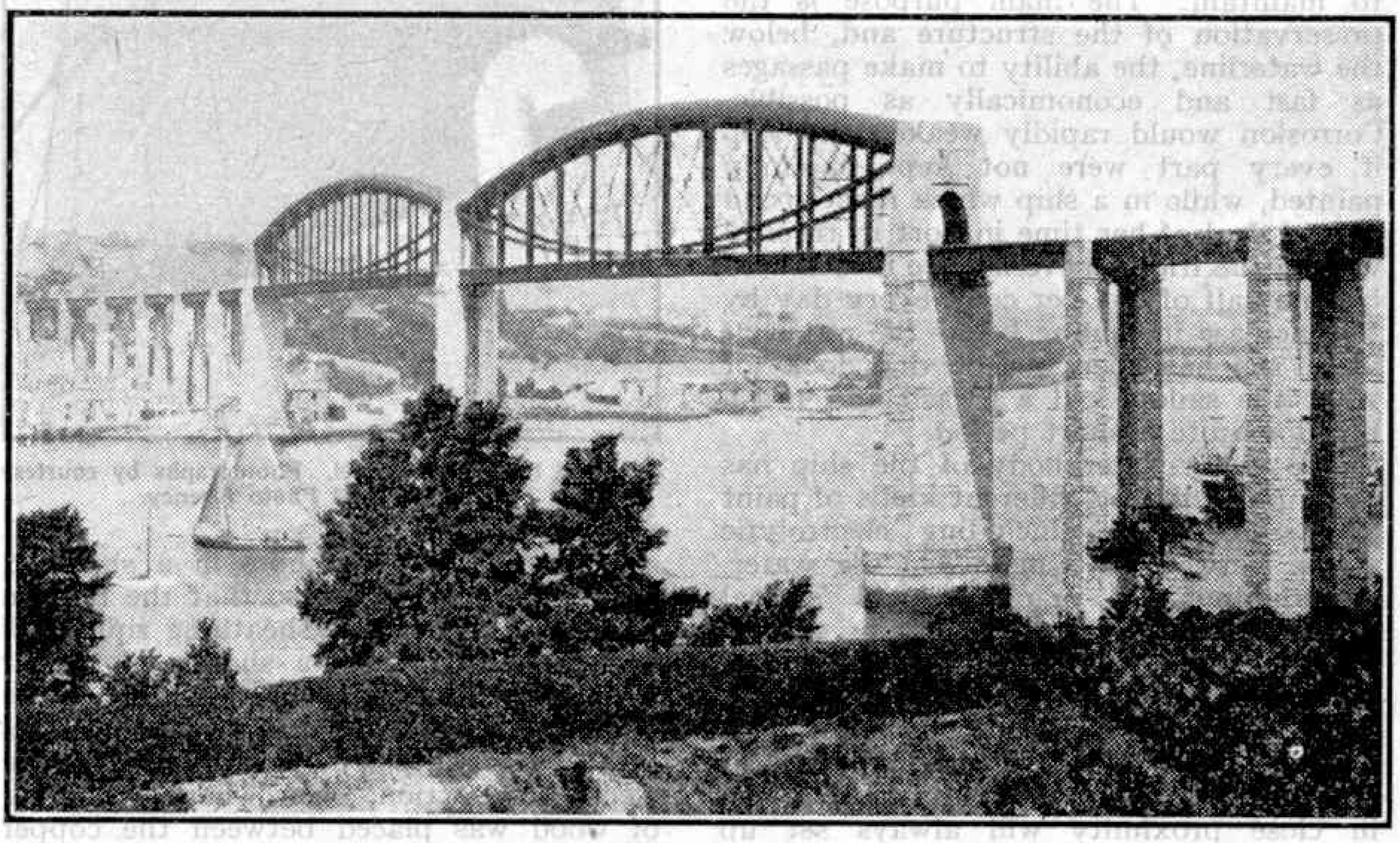


View through one of the portals of Royal Albert Bridge, showing the connections between the upper tubular "bow" and the girders supporting the track.

water over a thick bed of mud constituted a challenge to Brunel, who explored the bed of the estuary by means of a large wrought-iron cylinder in order to provide a foundation for the central pier. Armed with the knowledge thus gained, he completed his plans, and work was begun in 1853 on the most important and the most difficult task of building this pier. For the purpose Brunel used another cylinder that was, in effect, a cofferdam and diving bell together, arranged so that after the central pier had been built inside it, the cylinder could be divided and removed.

pontoons were then filled with water, and as they settled, the ends of the spans rested on the piers. Brunel himself personally directed the placing of the western span, which was dealt with first. Then came the lifting of the span in stages by means of hydraulic jacks, while the piers were built up until the final position some 100 ft. above high water was attained.

Unfortunately, on account of ill-health, Brunel was not able to be present when the second span was placed; and in fact when in May 1859 the bridge was opened by the Prince Consort from whom it gets



An attractive structure in pleasant surroundings. Royal Alberi Bridge crosses the Tamar between Devon and Cornwall. Photographs by courtesy of British Railways (Western Region).

It is the two main spans or trusses, however, that really capture the imagination. Oval "bowed" iron tubes with their ends connected by suspension chains of link plates form the top members of each span. The bow and chains are joined by vertical members diagonally braced as shown in the lower illustration on page 290. The horizontal girders carrying the road bed are slung from these vertical members. Each span is 455 ft. long and 56 ft. high at the centre, and weighs over 1,000 tons.

The installation of these spans was a big job. Both spans were built on the Devon shore and by means of pontoons were floated out into position so that their ends came over the pier bases. The

its name, he was abroad undergoing treatment. He lived to see his last great work completed, however, and on his return he was taken slowly across the bridge for the first and last time.

In 1905 some new cross girders were put in, and the first two land spans at the Cornish end were reconstructed so that the up and down tracks at Saltash station could be extended. Then in 1928 the remaining 15 approach spans were renewed, a special "erection wagon" being developed for the job. This could not only deal with the side girders, but could also support the flooring of each span in turn while the actual change of girders was being made. The whole operation was a notable example of careful planning.

The Painting of Merchant Ships

By Frank C. Bowen

THE painting of merchant ships makes a very considerable item in the shipowner's expenses; appearance is a very secondary purpose, although it is important to a passenger firm or any other company with a reputation for smartness to maintain. The main purpose is the preservation of the structure and, below the waterline, the ability to make passages as fast and economically as possible. Corrosion would rapidly weaken the ship if every part were not kept carefully painted, while in a ship which must spend a good deal of her time in port in tropical waters, the frictional resistance is increased by one half of one per cent. every day by the increase in fouling below the waterline after she has been out of dry dock for what the sailors call a "wash and brush up" for quite a short period.

The under-water body of the ship has to be protected by different kinds of paint against corrosion, including electrolytic action between two metals in sea water, and fouling by vegetable and animal growths. Anti-corrosive paint is always applied first, different in nature from that put on the topsides, and covered by an anti-fouling composition to check the growth of weeds and marine creatures of various kinds. Copper and iron or steel in close proximity will always set up electrolytic action which deteriorates the ferrous metal very quickly. It is not necessary for them to be touching; steel ships with bronze propellers must have the hull round them painted with a special composition to supply a watertight skin which will insulate the hull and rudder. That composition is frequently black, and accounts for the patch on the stern of many ships whose boot-topping, the section of the hull just above the water, is red or green.

The anti-fouling composition is perhaps the most interesting of all the paints which are applied to ships. In the old days of wooden hulls the teredo and other boring worms eating into the hull were the ship's greatest enemies, so that those making long voyages were given a sheathing of soft wood to give the worms a meal without endangering the structure of the ship. When the sheathing was riddled the ship would be put ashore in a sheltered anchorage, hove down so that the bottom was exposed, and the sheathing ripped off and replaced. Later a sheath of copper was substituted with much more satisfactory results, although it was expensive; but when ships had iron hulls the electrolytic action, even when a padding of wood was placed between the copper and the iron, caused it to be abandoned in all but exceptional cases, and anti-fouling compositions took its place.

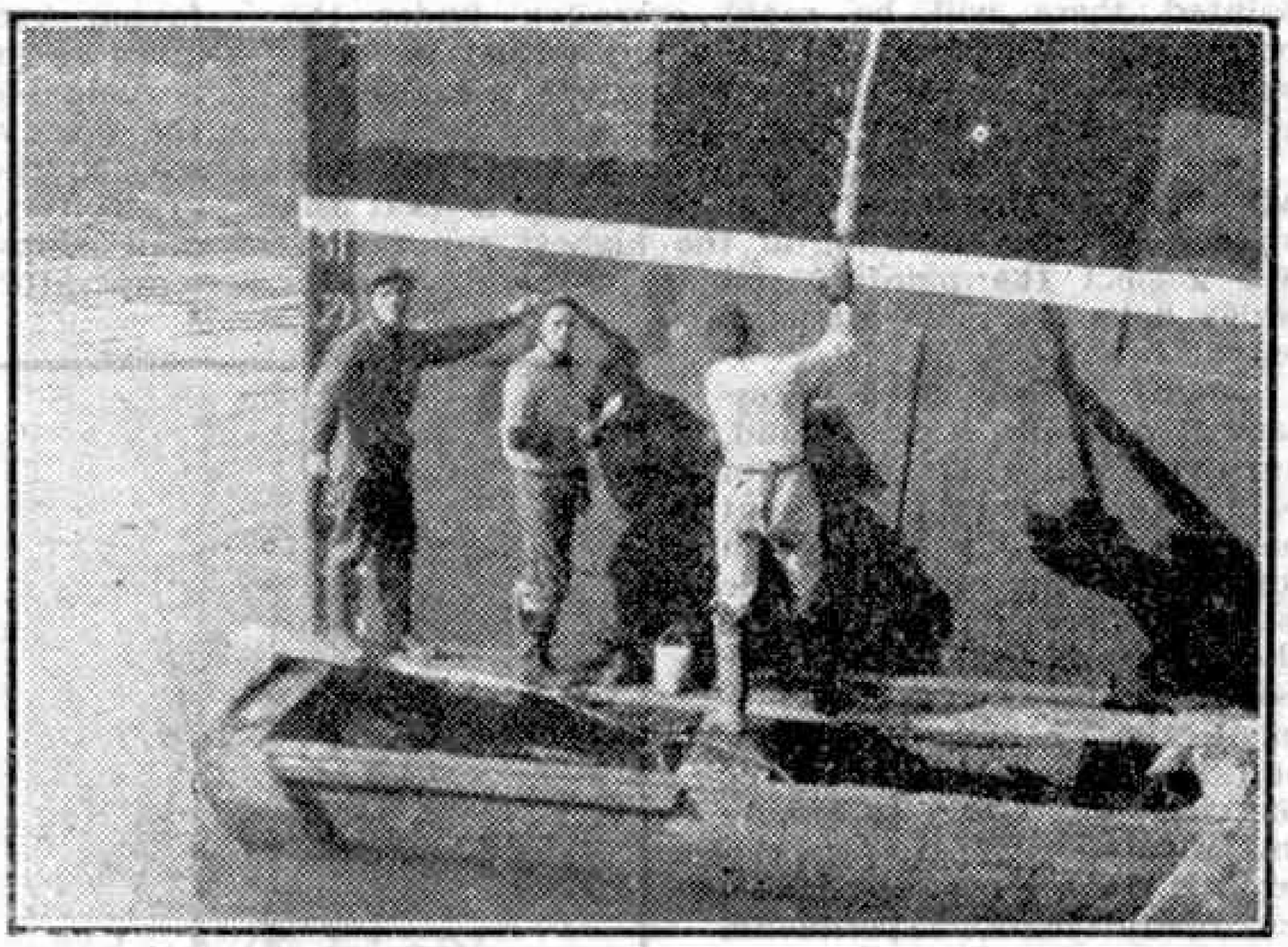
Painting the ship's funnel. Photographs by courtesy of the Nautical Photo Agency.

Anti-fouling composition has to deal with a very wide range of both vegetable and animal growth. Practically all the former is on the waterline or a few feet below it, for it cannot thrive without light and air and is therefore much more troublesome in clear water than in muddy. The sailor calls it all grass, but it includes an enormous variety of seaweeds. They begin with microscopic spores which rapidly develop into a slimy layer and then into long grasses or weeds. They can make a very big difference to the ship's progress through the water, but they are not as troublesome as the animal growths because, being flexible, they lay back along the ship's side as she moves. The animal growths are much more troublesome

because they project straight out from the ship's side. They also exist in enormous variety. Barnacles are the best known, but there are also tube worms, sea squirts, polyzoa, hydroids and, only really troublesome in laid-up ships, mussels and oysters. All these creatures are exceptionally tenacious.

The essence of all anti-fouling compositions is poison, generally mercury, which is twice as effective as copper against weed and three times as effective against barnacles, but is very expensive. They are mixed with a special quick-drying paint and applied when the ship is in dry dock, although they lose a good deal of their power if she is not immediately put afloat. The paints gradually wear away, so that a continuous supply of poison is available on the surface to be protected. Care is naturally taken to make the wastage as slow as possible, but all compositions have a limited life and have to be frequently renewed, 12 months being the outside limit for the strongest to function effectively. After that the fouling gets the upper hand, and the ship's speed goes down while the fuel bills go up. Some of the most effective poisons corrode steel rapidly, so that the layer of anti-corrosive paint under the anti-fouling must never be neglected.

So much fuel was wasted during the war through ships getting foul that all countries carried out some interesting experiments. Colour has a big influence; white below the waterline seems to repel both animal and vegetable growth, the trouble getting worse as the colour gets darker. Barnacles and other sea creatures cannot live in fresh water; even the brackish water in the River Plate kills them in millions, while for many years past ships have locked into the fresh water Union Canal behind Seattle to get rid of animal fouling. The shells remain after the creature is dead, but they soon become brittle and can be scrubbed off quite easily.



The white cutting-in line between the boot-topping and the paint on the ship's hull is one of the "tiddley jobs" that the sailor loves.

The boot-topping—it was called "boot-hose topping" in the seventeenth century—is the space between the load line and the ship's waterline when she is absolutely light. That does not require anti-fouling composition, but it is particularly troubled with vegetable growth, while rust forms very rapidly on the waterline. It is painted with a special composition, usually red or green, which is not as expensive as the anti-fouling composition but costs more than the paint normally used on other parts of the hull. The colour adds considerably to the smart appearance of the ship, particularly if she has a white "cutting-in line" between the boot-topping and the topside paint, although that line is most difficult to paint and its effect is completely spoiled if it is at all wavy.

Although it is not necessary to contend with vegetable and animal growths above the waterline,

Time in port for the handling of cargo gives the opportunity for the crew to repaint the sides of the ship.

painting is just as important to preserve the fabric from corrosion. It starts when the ship is on the building slip and continues at very frequent intervals as long as she is afloat. Unless measures are periodically taken to remove the layers of old paint and get right down to the steel, there is not only a danger of rusting under the protection, but in an old ship the weight of the paint may become sufficient to impair her carrying capacity by a surprising number of tons.

During the manufacture of steel plates a layer of oxide, called mill-scale, forms on the surface, and unless this is carefully removed before the ship is painted there will be rapid corrosion under the protection. It is usually done by means of acid, and the whole of the ship is then given a coating of genuine red lead before being painted.

One of the main anxieties of the superintendent who watches the construction of a ship is that the builders, if they are not of the highest reputation, will neglect the painting, for it is the first coats which have the most influence on the life of a ship.

Quality is even more necessary at sea than it is on land, and while different kinds of paint are needed for different parts of the ship, and often for the service on which she is engaged, their principles are the same in that the four essentials are always the pigment, the binder, the thinner and the drier. Owing to the scarcity or cost of many ingredients which have been regarded as the best obtainable for many years, experiments were started during the war, and are continuing, to find substitutes, some of which promise to be more satisfactory than the original ones.

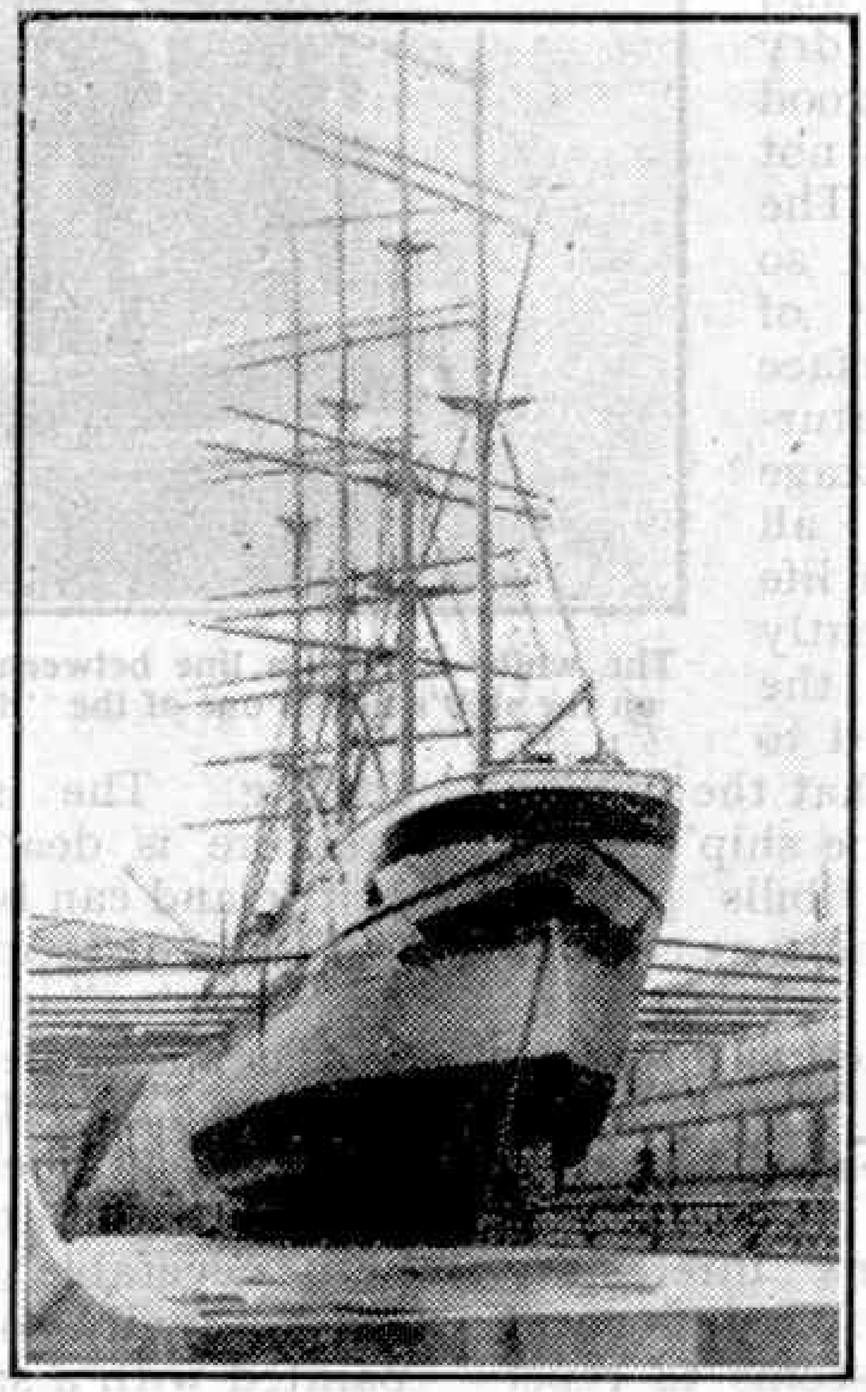
The pigment supplies the colouring, and can be mineral such as white lead, zinc oxides, barytes and many others, vegetable such as logwood and saffron, or aniline dyes extracted from coal tar. Titanium and antimony oxides are being tried instead of lead and zinc and are proving stable and able to keep their colour well.

The binder is used to bind the pigment down and prevent it working out. Vegetable oils have been the normal method for years, and boiled linseed oil is generally regarded as the best, although it must not be used for white paint or it will dry a cream colour. Dehydrated castor oil or tung oil are sometimes used instead of linseed, and in recent naval experiments linseed has been partly replaced by synthetic resin media of the alkyd type. The experiments with this are still in progress but it promises to make the paint last much longer.

The thinner is intended to make the painting easier; American turpentine or white spirit derived from petroleum are among the best known.

The driers have no protective qualities; acting on oil but not on the pigment they accelerate the hardening, although if they are too generously mixed in with the paint they shorten its life. Red lead or terebene, raw linseed oil, gum copal, monoxide of lead and other things are among the most popular. The drier has to be added to the paint just before it is to be used as it forms a skin very quickly. There are a number of patent driers on the market, some of which are admirable. Others have their disadvantages as, for instance, the type which was very popular in the Navy until the gas which it gave off while stored in the paint locker caused an explosion which destroyed H.M.S. *"DOTTEREL"* with heavy loss of life. Some contain acid which reduces the protective value of the paint.

The colours chosen for the hull are very much a matter of uniform; quite a number of companies have distinctive hulls either by the colour itself or the particular tint. Where the tint is important the paints are generally mixed on board, and the ships carry a small plate painted with the exact shade to act as a copy. The Union Castle Company's lavender grey is unique, but a large number of companies favour grey of different tints. For one thing it gives an impression of size without clumsiness, which is valuable for impressing passengers, but it has the disadvantage of a tendency to "chalk" under sea conditions, the pigments breaking out. A number of fruiters, liners on yachting cruises and certain mail ships have white hulls, generally for internal temperature or a yachty appearance. The disadvantages are that constant attention is necessary to keep it looking well; it tends to make the ship invisible in fog, which is embarrassing to other vessels meeting her, and it often goes badly with the company's funnel paint, particularly if that is red. Black hulls are still in the majority and black paint is the cheapest. It costs less than most coloured paint to begin with, and it can be thinned more than any other, permitting the same quantity to cover a much larger area.



Different kinds of paint are needed for the section of the hull which is always submerged, the section which is sometimes submerged, and the section which is always out of the water.

Paint is applied either by shore gangs between voyages or by the crew in ports of call or at sea. Although the seamen always prides himself on his skill with a paintbrush, the former is generally the more successful. Not only are the men more practised, but when the crew do the work there is seldom time for the cleaning and smoothing that is really necessary for the best results, and unless the surface is absolutely dry when the paint is applied the sun will soon draw out the moisture and cause it to blister. That causes a lot of the painting done at sea during the homeward voyage to have a very short life.

Spraying machines worked by compressed air are frequently used instead of brushes for large areas. This saves both time and paint, but it does not adhere as well as brushwork and is liable to have pinholes owing to the aeration of the paint. Patent brushes supplied with paint by compressed air are sometimes used.

The most difficult part of the modern hull to paint is the bow, owing to the flare or outward curve of the plating which makes it necessary to bowse the stages in to the ship's side with ropes. In the older types the plating under the counter was another very difficult part and some types of cruiser stern can be awkward.

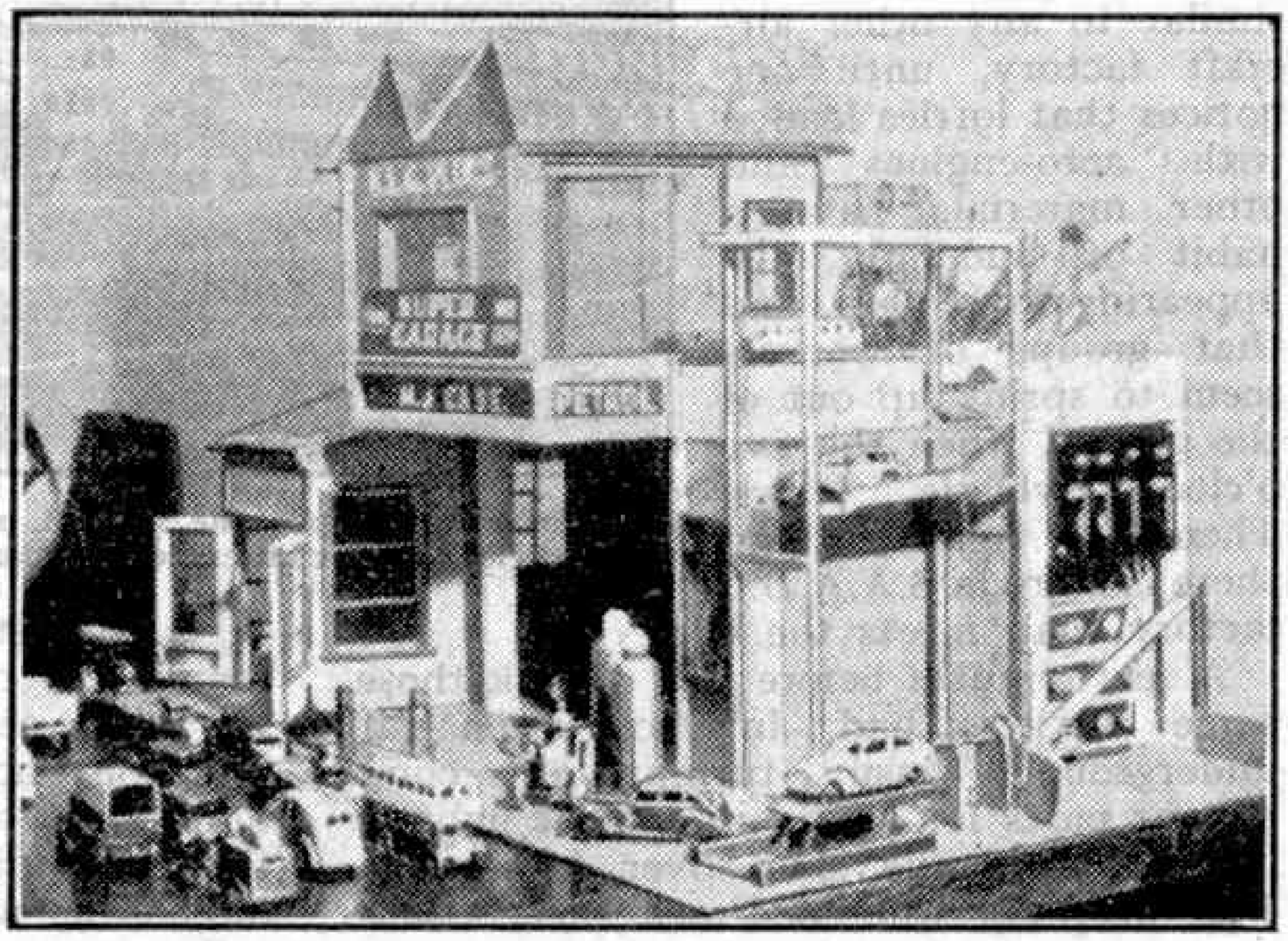
The superstructure, deckwork and houses of ships, particularly passenger vessels, demand special care as they are under observation at all times. In liners covering tropical routes the colour is carefully selected to reduce eyestrain, and various colours have been used as alternatives to white. A very pale green has proved successful, and various shades of light grey have also been tried. Enamel paint or a protective covering of (*Continued on page 324*)

Fun with Dinky Toys

Layout with a Well-Equipped Garage

A NOVEL scheme for play with Dinky Toys has been worked out by Michael Case, Mitcham, who had the bright idea of building a garage as the central feature of a Dinky Toys layout of roads, constructed in association with a Hornby Railway. It will be realized that the combination gives its designer a wealth of opportunity for interesting operations of a varied kind. He gets real fun from his Hornby Trains, runs cars and lorries on his road layout, much of this traffic carrying passengers and goods to the station of his railway, and in addition he has the pleasure of realistic working at his garage, which he has made as complete as possible in the limited space available.

The interesting garage section of Case's layout is shown in the illustration on this page. It stands on a three-ply board, 29 in. long and 18 in. wide, the edges of which have been planed down so that cars can run on and off easily. The building itself is constructed on a $\frac{1}{4}$ in. $\times$ $\frac{1}{4}$ in. wood framing, which has been covered with cardboard. The walls have on them brick paper to give the right appearance, and tile paper makes the roof look like the real thing.



This fine garage is part of the Dinky Toys layout of Michael Case, Mitcham.

The general effect is excellent, and many little details add greatly to the realism of the building. For instance, the windows are made of mica in wooden frames that stand out from the walls in which they are inserted, and are carefully lined out. All pillars are painted cream to represent stone work. The repair shop, on the upper floor, has doors that are suspended on runners and can be folded back in exactly the same way as those of many real garages.

Special attention has been given to lighting. The petrol pumps, which are home made of wood, have domes at the top, which contain small electric light bulbs. The nameboard over the entrance also is illuminated, and both the show room and the repair shop are fitted with electric lighting. The current required is obtained from bell batteries housed in a special section at the back of the model.

As will be seen from the illustration, there is a ramp on which cars can be raised for greasing and other necessary attentions, exactly as in real garages, and there is also an ingenious lift by means of which vehicles can be taken up to the repair shop. The lift is driven by a Meccano Electric Motor of the reversing type, with gearing to give the correct speed, so that excellent control is given both up and down. The lift itself is made of thin aluminium and thin brass strips of the type that can readily be purchased from stores. A special hand winch and brake is fitted for use with heavy loads.

The equipment of the garage also includes a Breakdown Lorry, while among the Dinky Toys to be seen on the layout when this is in operation is an Ambulance. A full service of Single Deck and Double Deck Buses also is run, and of course private cars and commercial vehicles are always moving along the roads, especially in the direction of the station. The lorries used are provided with loads consisting of pieces of wood. To add to the fun Case has introduced "speed cops," who keep a sharp eye on road users.

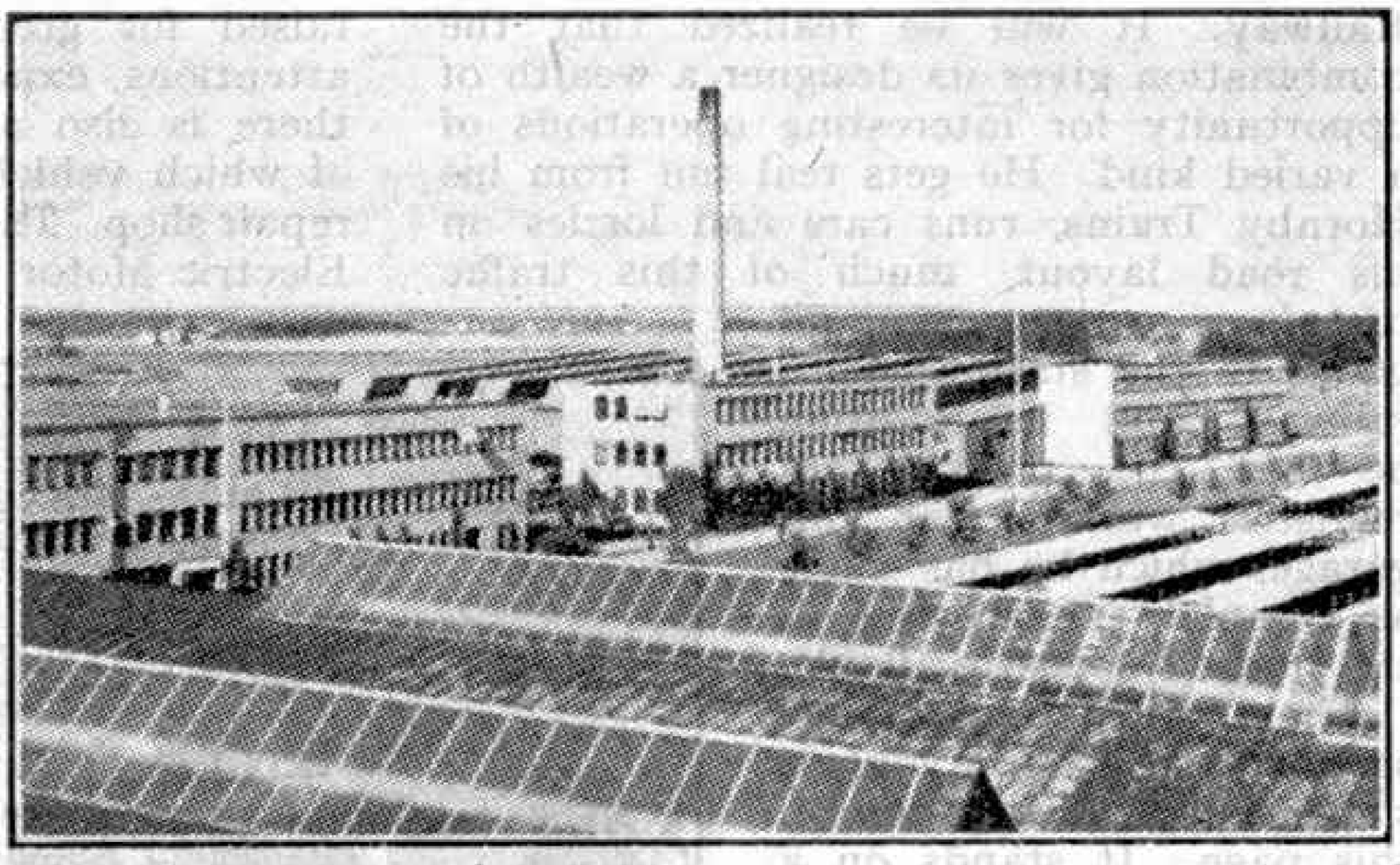
Building Aircraft Underground

By John W. R. Taylor

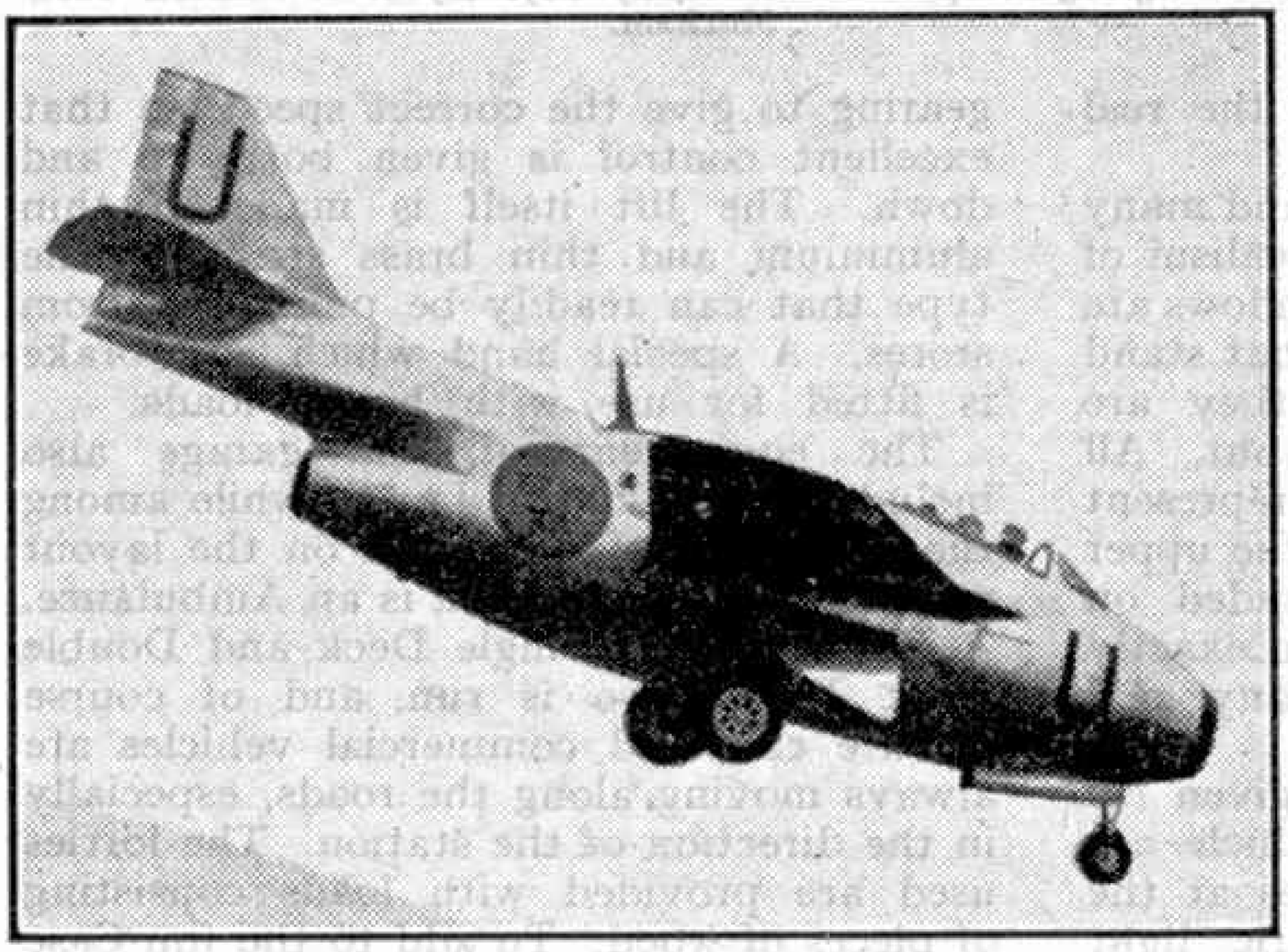
AT first sight, the S.A.A.B. Aeroplane Company's factory at Linkoping, in Sweden, looks just like any other modern aircraft factory. Clean white office buildings and rows of workshops lead out on to an airfield, above which perhaps a neat twin-engined air liner flies peacefully on a routine test flight, or a tiny barrel-shaped jet fighter zooms up in a spectacular rolling climb, to disappear into the clouds.

Yes, it is all very similar to any other aircraft factory, until one notices that lorries loaded with aero-engines and other materials have a habit of suddenly disappearing from view, and that groups of workers seem to spring up out of the ground when the five o'clock whistle blows. Then one realizes that there is more in S.A.A.B.'s factory than meets the eye.

A few minutes before five o'clock those same workers had, in fact, been far underground, busily turning out component parts for air liners and jet fighters like those in the skies over Linkoping. For deep in the bed-rock near their airfield, S.A.A.B. have carved out a self-contained factory with modern workshops quite as good as any above ground, and complete with dining and conference rooms, reception halls and all the other refinements of a normal factory. In fact it is almost impossible to believe that many feet of solid rock lie between the workshop ceilings and the outside world, until one notices that there are no windows anywhere and that the clocks on the wall indicate the state of the weather outside as well as the time.



The surface buildings of the S.A.A.B. plant at Linkoping. The illustrations to this article are by courtesy of Svenska Aeroplan A.B., Linkoping, Sweden.

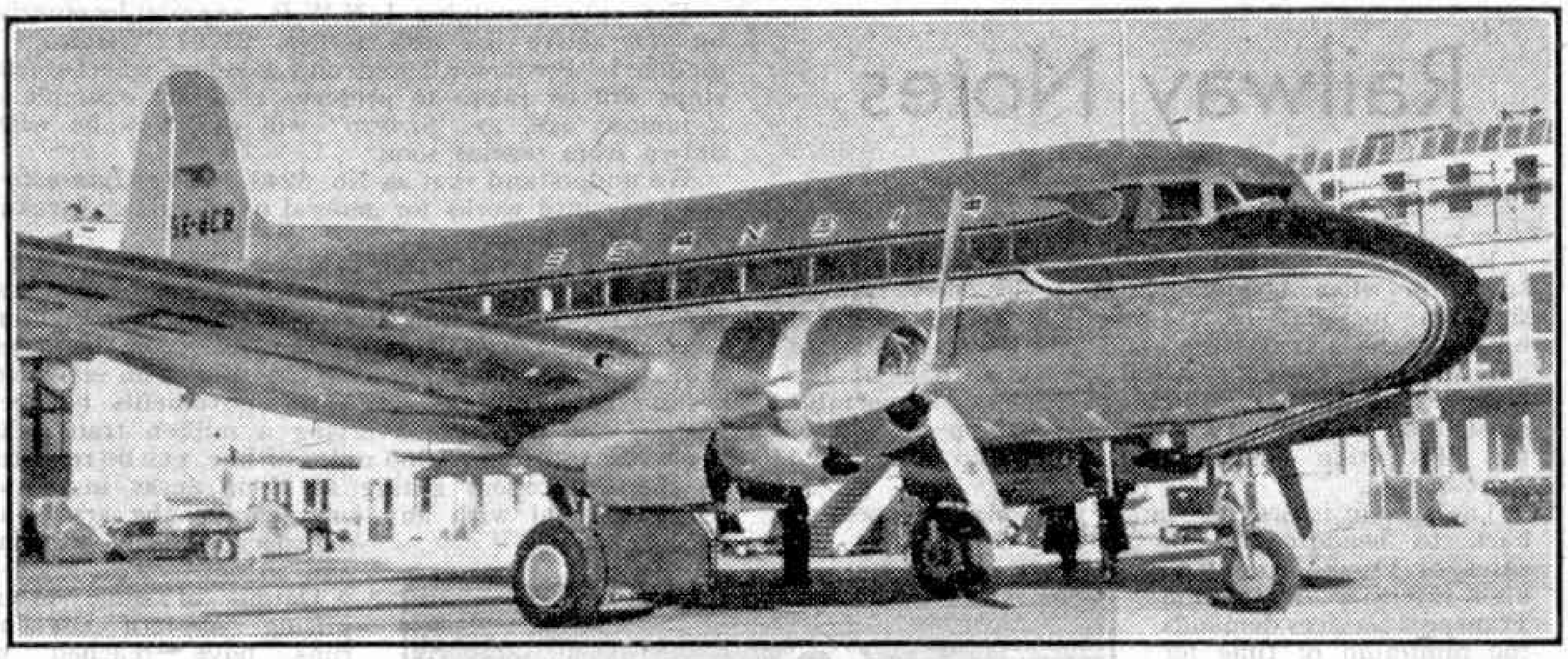


The SAAB-29, one of the world's fastest jet fighters. It is powered by a de Havilland "Ghost" engine.

This is by no means the first underground aircraft factory, but it is almost certainly the finest ever built.

Living precariously in neutral Sweden during the war, S.A.A.B. had plenty of opportunity to study the effect of air bombardment on their neighbours, Germany and Russia. What they saw convinced them that, unless they put their assembly lines beyond the reach of bombs, Sweden would probably lose her entire aircraft industry within a week if she were attacked. So they decided to move a large part of their factory underground.

Having made up their minds, they set to work at once blasting caves in the bed-rock,



SAAB "Scandia" twin-engined 24-32 passenger transport.

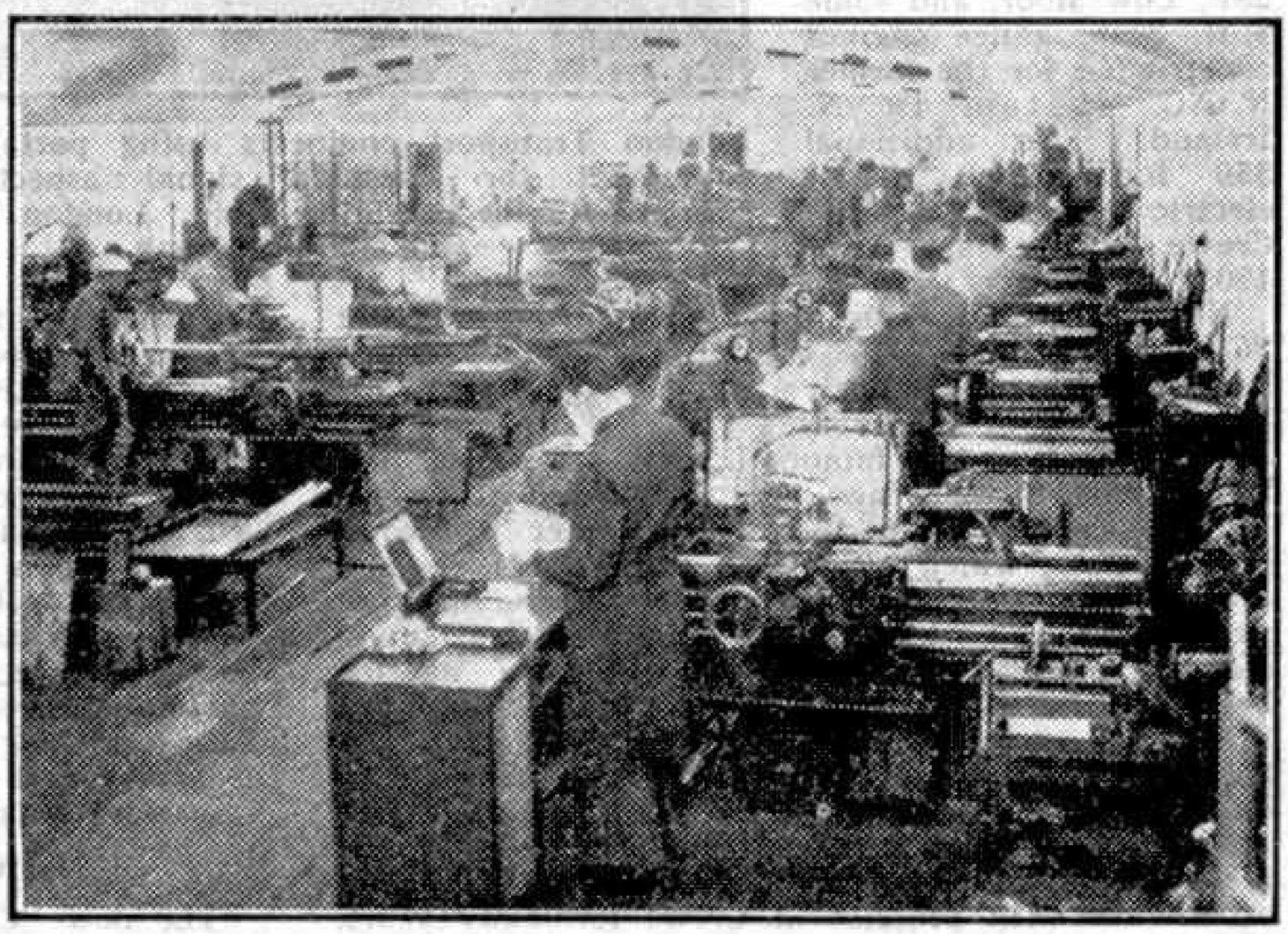
into which they built concrete workshops, together with self-contained air-conditioning, lighting, fire-fighting and drinking-water plant. Progress was so rapid that production in the factory started well before the end of the war, at the time when the company were making SAAB-18 twin-engined medium bombers for the Swedish Air Force. It was soon apparent that workers suffered no ill effects from working below-ground; in fact they liked the pure air and constant temperature of the new workshops. The experiment was a success.

Since VE-Day, work has continued underground at full pressure, chiefly on component parts and sub-assemblies which are made up into complete aircraft in the above-ground factory. But in the event of war, final assembly too would move underground, out of reach of even the most powerful bombs.

To-day S.A.A.B. are building a complete range of civil and military aircraft at Linkoping, in addition to a neat little 4-seat motor-car—the SAAB-92. Already they have supplied Swedish Airlines with their first Swedish-designed air liner, the "Scandia," and it is probable that other European airlines will adopt this aircraft too, as it combines good performance with ability to operate from small runways in rugged country. S.A.A.B.'s 3-seat light 'plane, the "Gipsy" - powered "Safir," has also proved highly successful and has been exported to India, South America, Africa and several European countries.

The SAAB-21 twin-boomed fighter and its "Goblin"-engined jet development, the SAAB-21R, are both in large-scale service with the Swedish Air Force. They will almost certainly be followed by squadrons of the new "Ghost"-powered SAAB-29, for this tubby little fighter is one of the fastest aircraft in the world, with a speed of over 650 m.p.h. The de Havilland "Goblins" and "Ghosts" are built under licence in Sweden, so there are no supply problems.

With a series of first-class aircraft already to their credit, Svenska Aeroplan A.B. have every right to feel proud of their past achievements and confident about the future.



Workshop bay for slide lathes, in the underground part of the factory.

Railway Notes

By R. A. H. Weight

Radio in Railway Service

Radio is extensively used by London Transport engineers when bringing into service new railway signalling installations. Communication is established between the signal cabin and points or signals for checking the correct setting and operation of the latter. The picture on this page shows a portable radio used in this way. The engineer on the left of the illustration has his portable radio set closed for carrying.

The system is proving highly valuable for reporting back to headquarters in cases of breakdowns. The high intensity of London Transport services demands the minimum of time for repairs, and radio on the spot is of special value in reporting progress or for calling reinforcements, equipment and so on.

London Transport engineers using portable radio equipment for checking signal aspects at a station with the operating cabin. London Transport Official Photograph.

London Midland Region

Continuing new locomotive construction, Crewe Works have completed class "5" mixed traffic 4–6–0s numbered 44721–7, fitted with steel fire-boxes and allocated to 5A shed, Crewe North. No. 44658, which begins a fresh series, with electric lighting, has been placed in service at 14B, Kentish Town.

Class "4" 2–6–0s built at Horwich for the Midland Division were as follows: No. 43031, 17A, Derby; No. 43032, 19A, Sheffield; No. 43033, 16A, Nottingham; and No. 43034, 20H, Lancaster.

New 2–6–4Ts from Derby Works include Nos. 42109–10, stationed at 25F, Low Moor, and some 5 ft. 3 in. gauge engines constructed for the former N.C.C. system in N. Ireland. Two additional 350 h.p. 0–6–0 diesel-electric shunters at 5B, Crewe South, are Nos. 12052–3.

Notable withdrawals have included the last "Claughton" "5XP" 4–6–0 rebuild, No. 6004, which had been the sole survivor of her type for some time, running in red livery.

The last of another famous L.N.W. 4–6–0 class first introduced 38 years ago also has been withdrawn. This was No. 25752, of the inside-cylinder "Prince of Wales" class, which by 1924 comprised 246 engines. Many of these were then engaged on the heaviest passenger work. About 100 "Princes" carried names, and "*Lusitania*," which was withdrawn at the beginning of 1949, was the last named survivor. The "Princes" carried numbers between 25600 and 25845 in recent L.M.S. days; five were fitted with outside Walschaerts valve gear, an unusual feature in conjunction with inside cylinders and valves; the rest had Joy valve gear between the frames in accordance with practice at Crewe for many years. No. 25752, like other recently surviving "Princes," was stationed at Stafford.

The only remaining L.N.W.R. express locomotive on the active list now is No. 25297 "*Sirocco*," a modified "Precursor," and one wonders whether any steps will be taken to preserve this last example of a famous age, as "*Sirocco*" will probably be withdrawn from service soon.

We understand that as No. 6243 "*City of Lancaster*" has gone into works for general overhaul, no streamlined 4–6–2 is now running.

A new 154-lever frame has been installed in No. 5 signal box, controlling the busy traffic working at the north end of New Street Station, Birmingham. A remarkably well-equipped Control Room has been brought into use at Crewe. By means of an elaborate system of telephones, all train movements between Euston and Carlisle, involving a million train miles per week and some 2,400 miles of line, can be reported to the Controllers sitting at their desks in Crewe ready to deal with any emergencies, the arranging of special traffic working and so on.

Details of some enterprising Western Division runs have reached us lately. Hauling the down "*Royal Scot*" before the introduction of the summer schedules, 4–6–2 No. 46225 "*Duchess of Gloucester*," in charge of a Camden driver with a 16-coach train weighing about 535 tons gross, gave a fine performance well beyond the requirements of present timings. A minimum of 55 m.p.h. was sustained up the gentle rise to Tring, passed in 2½ min. less than the 41 min. allowed from Euston. A maximum of 77 was attained down the descent to Leighton Buzzard, followed by an average of 70 over the easily undulating 14¼ miles on to Castlethorpe, providing impetus to carry this heavy train over the Roade rise at 58 m.p.h. Despite a short signal stop, Rugby, 82¾ miles, was reached two min. before the booked arrival time. Good running continued on to Crewe.

A Sunday run with a 13-coach train bound for Blackpool, also manned by a Camden crew, was considerably delayed owing to a long diversion to slow line on account of relaying operations, 50½ min. being taken to Tring, 31¾ miles. Modified "6P" 4–6–0 No. 6168 "*The Girl Guide*" more than recovered all lost time by averaging 69 m.p.h. over the 33 miles between Cheddington and Weedon, with maxima of 83, 76 and 74 m.p.h. at different points. The net time from London to Rugby, for which 101 min. were allowed, was probably no more than 88 minutes, allowing for delays.

Another reboilered "Scot," No. 6160 "*Queen Victoria's Rifleman*," with 15 on, 500 tons, gave a good run unchecked to the outskirts of Rugby, passing Blisworth 2¼ min. early in 68¼ min. from Euston after a maximum of 76 m.p.h. near Bletchley, so having time well in hand. Engines and men in each case were making long runs to the north.

Western Region Locomotive Notes

The new "Castles" are coming into service fairly rapidly. The first three of the latest series are No. 7018 "*Dryslwyn Castle*"; No. 7019 "*Fowey*

A Yarmouth train at Bentley, Eastern Region, hauled by "B1" class engine, L.N.E.R. No. 1119. Photograph by G. R. Mortimer.

Castle"; and No. 7020 "*Gloucester Castle.*" The newest examples are seen a good deal in South Wales, where "Counties" have recently been more in evidence, several appearing in lined black finish, as are certain "Hall" or other types. No. 6000 "King George V" of Bristol shed, was noted freshly painted blue at Swindon at the end of June. Further 0-6-0Ts recently completed at Swindon were Nos. 9681-2, allocated to Tondu and Tyseley respectively.

The 47xx 2-8-0 mixed traffic engines are still sometimes used for working passenger trains, and locomotives dating back to the Dean period even take a share. We noted 0-6-0 No. 2245, working a 9-coach Filton Junction-Bristol-Weston excursion; also 0-4-2T No. 3575 operating the Swindon-Highworth branch, perhaps the last of her kind to be so employed. The "Aberdare" 2-6-0s are becoming rare, though one or two may still be seen on freight workings in the West Midlands.

The heavy West of England holiday traffic continues to provide much locomotive interest at summer week-ends along the lines between Paddington and Devonshire, but if only the majority of engines were cleaner how much easier it would be to note names and numbers as they pass! The 45xx or similar types of 2-6-2T handle much of the branch line working in the West; "Granges" are used a good deal in Cornwall; 2-6-0 engines work through Reading over Southern metals to Redhill on summer Saturdays. The first gas-turbine locomotive was expected to appear shortly at the time of writing.

News from The East Coast Route

The North British Locomotive Company is turning out "K1" 2-cylinder 2-6-0s for the Eastern and North Eastern Regions. The design is similar to the rebuilt "K4" engine latterly numbered L.N.E.R. 1997, named "*Mac Cailin Mor*," having boiler, cylinders and motion of the Thompson standard "B1" type. Nos. 62001-5 formed the first batch allocated to Darlington.

Some of the "A1" 4-6-2s are painted blue. Recent allocation of new "Pacifics is as follows: Nos. 60126-7, Heaton; No. 60128, Copley Hill, Leeds; Nos. 60142-3, 60145, 60147, Gateshead; Nos. 60144, 60146, Doncaster; and Nos. 60148-9, Grantham. Several "A3s" are blue, with black and white lining, having the British Railways emblem on tender, while the latest darker green finish, with black and orange lining, is beginning to appear on "A2" engines. "B1" 4-6-0s from the G.C. Section are seen at Swindon (W.R.) and at Nottingham and Leicester (L.M.R.).

"Pacifics" of various classes amass very large mileages, making regular double trips such as King's Cross—Leeds or York, or vice-versa, and Grantham-Newcastle. Instances are: "A3" No. 60106 "*Flying Fox*," built as an "A1" in 1923, 5,371 miles in two weeks; and No. 60107 "*Royal Lancer*" 1,392 miles in three days, including the haulage of the "*Tees-Tyne Pullman*" from London to Newcastle. Various new "A1s" have covered well over 8,000 train miles in four weeks.

Three "A4" engines and "A3" No. 60039 "*Sandwich*," stationed at Grantham, have been maintaining for a long period continuous operation of two-day rosters, working the "*Flying Scotsman*" and other East Coast expresses between Grantham and King's Cross, then Grantham-Newcastle. "A4" No. 60027 "*Merlin*," of Haymarket shed, regularly hauled the new "*Capitals Limited*" non-stop train between Edinburgh and London on alternate days over a long period during June.

"A3" No. 60097 "*Humorist*," on the 10.25 a.m. down Leeds, following a late start from King's Cross with 15 coaches, recently gained 7 min. to Peterborough.

A Mobile Window Washer

The mobile window washer seen in action below is used for cleaning the windows of passenger trains during their stops at Pocatello, Union Pacific Railroad. The machine was designed and built in the Union Pacific's car department at Pocatello and is operated by one man. It works fast enough to be driven down one side of a 12-car streamliner such as "*City of Portland*" and back up the other side in eight minutes, cleaning the windows as it goes. The principle is simple: water is sprayed on the windows—30 gallons are used on the "*City of Portland*"—and the glass is scrubbed by a revolving brush.

Cleaning a streamliner's windows during a stop at Pocatello on the Union Pacific Railroad. The mobile washer sprays the windows and scrubs them clean by means of a revolving brush. Union Pacific Railroad Official Photograph.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With certain exceptions, which will be indicated, these should be ordered through a bookseller.

"THE LOCOMOTIVE EXCHANGES 1870-1948"

By CECIL J. ALLEN, M.Inst.T., A.I.Loco.E.
(Ian Allan Ltd. 12/6)

Locomotive exchanges have given Mr. Allen the opportunity of telling the kind of story in which he excels, allowing full scope for typically careful comparisons of recorded runs of a series of engines over various routes in turn.

The great exchanges of 1948, which caused such a stir among railway enthusiasts, occupy some two-thirds of the book, and the account of this is preceded by details of earlier exchanges, particularly of the historic G.W.R. "Castle" and L.N.E.R. "Pacific" contest of 1925, and of various earlier trials. Readers will be interested to note that the first of these occurred in 1870. The author explains the reasons behind these locomotive contests, and their influence or otherwise on subsequent practice, and engaging details are included of runs made by competing engines in various exchanges. Many of these runs were timed by Mr. Allen himself, and as usual his descriptions of these are full of interesting detail. Comparative tables of dimensions and of individual performances add to the interest of the account.

The book is fully illustrated, particularly with regard to the 1948 exchanges. Copies can be obtained at 13/3 each from book shops and agents of the publishers, or direct from Ian Allan Ltd., at 33, Knollys Road, Streatham, London S.W.16.

"HOLIDAY PHOTOGRAPHY" (Price 2/-)

"CAMERA-TIPS FOR EVERYONE" (Price 1/-)

By F. and M. PARTINGTON
(Fountain Press)

The first-mentioned is No. 14 in the "Photofacts" series of pocket handbooks, and has appeared just in time to be of value to the thousands of amateur photographers in search of practical advice on holiday photography. Excellent guidance is given on choosing the right photographic equipment for the particular kind of holiday travel that has been planned, on the intelligent use of guide books and maps to help in locating good subjects, and on estimating the pictorial possibilities of these when they are found. The full-page half-tone photographs reproduced are excellent, as is usual with the books of this series.

"Camera Tips for Everyone" contains alternate pages of text and half-tone illustrations, each page of text containing hints on a particular aspect of photography. The subjects touched upon in this way include focussing, exposure, portraits, landscapes and seaside and city scenes, and series of pictures that tell stories. There are also many general hints designed to help the amateur to get good sharp pictures.

"THE RAILWAY MODELLERS' HANDBOOK"

(Gaskell and Christian Ltd. 2/6)

This book is intended particularly for those whose interests are specially concerned with railway constructional modelling, but it contains also hints that will be found useful by readers who operate ready-to-run standard commercial components.

There are four main chapters by different writers. The first of these deals with the scenic side of railway modelling. Another is concerned with the photography of model railway subjects which, as most readers of the *"M.M."* will know, is a rather specialized business, and miniature steam locomotives and American-style model railroads are the subjects of the remaining chapters.

Several tables and diagrams add to the usefulness of the book, while various illustrations in line and half-tone bring out the different points that are considered.

"THE BEGINNER'S BOOK OF STAMP COLLECTING"

"THE SPLENDID BOOK OF POSTAGE STAMPS"

By STANLEY PHILLIPS
(Sampson Low, Marston. 5/- each)

Mr. Phillips is a great stamp expert, and boys who are starting to collect stamps, and those who have already made some progress, could have no better guide in the hobby. In these two books he gives both classes of collectors a great amount of information of exactly the type they want.

In the volume for beginners he tells how stamps are produced, explains how to identify them, and deals with such matters as inscriptions, surcharges, overprints and postmarks. The best way to mount and arrange stamps is fully described, with many other interesting and useful details; and there is a practical account of the best way of forming a stamp club in a school or among beginners, a practice that the author strongly recommends.

The second book will open new worlds to the collector and will put him on the right lines to get the greatest pleasure and amusement from a study of stamps and their designs. It begins well with a section on stamps of adventure, commemorating the exploits of pioneers and explorers of all kinds, and then deals with sport on stamps, and a wide range of other subjects of design. The book is full of interesting stories of stamps and stamp collectors, and ends with a stamp quiz that will help to illustrate the wide range of attractions and the wealth of information that stamps can give.

"BOADICEA"

By C. H. ABRAHALL (Harrap. 7/6 net)

This fine story has for its subject the fierce struggle of the first famous British Queen, who tried to free her country from the domination of the Romans. The author has based it on historical facts, and around these she has woven an attractive and interesting adventure story by following the fortunes of two British youths, pages of Boadicea, who undergo many hardships and enjoy several triumphs on special missions before the rising is finally crushed by the Romans. They themselves are carried to Rome as prisoners, but at last return to their native country and help to establish peace and prosperity there.

The book has a coloured frontispiece and other illustrations in line, and there is a good map on which the adventures of the boys and the progress of the war can readily be followed.

"FILM-STRIP PROJECTION"

By CECIL A. HILL
(Fountain Press. Price 5/- net)

This latest book by Mr. Hill, a practical man with years of experience in sub-standard cinematography, is intended for beginners and also for those who may be called upon to use some of the many different types of film-strip and film-slide projectors now available. The information given is therefore of a general nature and applicable to different types of projectors.

The aspects of the subject dealt with include slide and strip specifications, the preparation of film-strips and slides, and safeguards against film damage. The construction of a typical projector, its operation and maintenance are explained in detail, and there are descriptions of six representative current types of projectors. The book also includes a chapter on finding and correcting faults.

Lists of film-strip producers and distributors and film-strip projector makers are given, and there is a good index. Excellent half-tone illustrations and line drawings amplify the text.

"THE COMPLETE HANDYMAN"

(Odhams Press. 8/6 net)

The man of all work may have almost disappeared from trade and business, but in the home and garden he is more active than ever before. Here is a book that has been written for his special benefit, providing him with expert information and advice on almost any task that may confront him, and luring him on to greater triumphs in his endeavour to make home life easier and happier.

The range of the book, which runs to nearly 600 pages, is very wide. It begins with a section on wood and wood-working tools, and on the making of wooden articles large and small, including kitchen fitments and even bedroom furniture. A section on metalwork follows, in which motor car and motor cycle adjustments are dealt with, and after this we turn to radio, house decoration and repair, and work in the garden and small holding, finishing with a useful section on making a model railway and other miniatures.

The book is written in simple language, and no special skill or knowledge on the part of the reader is assumed. There are many illustrations in half-tone and line, with useful working drawings, and beginners and more experienced handymen alike will find that the book will repay its cost many times over.

"CONTROL-LINE FLYING"

"STUNT CONTROL-LINE FLYING"

By R. H. Warring

(Percival Marshall. Price 10/6 each)

Since its introduction into this country from the United States in 1945 control-line flying of model aircraft has become tremendously popular, and now rivals free flight in this respect. These two books are the first and second of a series of three planned to cover the whole subject of this pursuit. In the first of them the author draws on his extensive practical experience for the benefit of his readers. He deals very fully with control systems, control-line model types and their construction, operation and flying technique, motors, flying scale models and, finally, with sport flying. The book is well illustrated with line drawings and excellent half-tone photographs.

The second book in the series deals comprehensively with the design of stunt models, covering wing and power loading, design layout, component shapes and proportions, control systems, rigging angles and balance. Airframe construction is dealt with under specific headings, together with motors and stunt tanks, and a special feature is the inclusion of 18 general arrangement drawings of outstanding stunt models by world experts. There are more than 100 line illustrations, and appendix tables summarizing design and constructional data for over 40 models.

"THE LANCASHIRE AND YORKSHIRE RAILWAY AND ITS LOCOMOTIVES"

By R. W. Rush

(Railway World Ltd. 25/-)

This work contains in over 150 large-sized pages a great deal of information regarding the former Lancashire and Yorkshire Railway. It deals chiefly in detail with the locomotives of that line, but other sections summarize the history of the system and its services.

The locomotive section gives notes, dimensions, numbers and so on in regard to L. and Y. engines, from the Bury and Forrester creations of the earliest days to the 4-6-0 "Dreadnoughts" that appeared just before the end of the company's independent existence. Withdrawals under the L.M.S. and British Railways are noted up to May 1948, and the engine shed code used in Lancashire and Yorkshire days and the works numbers of engines turned out at the old works at Miles Platting and later at Horwich are given.

For a book of this scope the illustrations are somewhat disappointing. Line drawings alone are used, so that the book has a rather austere appearance throughout.

"FLYING SCOTSMAN"

By Alan Anderson

(Brockhampton Press. 3/6)

This book is introduced as "*Famous Train Journeys No. 1*," and in it the reader is taken on a typical journey by the "*Flying Scotsman*" from King's Cross to Edinburgh and Aberdeen. In the course of the run we learn a great deal about "the road" and its notable engineering structures, and the signals that guard the train, which itself is well described, with special attention to the restaurant service, long a special feature of the "*Flying Scotsman.*" Mention of the engine and its working and details of the footplatemen's duties lead to useful notes on what goes on in locomotive works and sheds to make sure that engines are well up to their work.

The plentiful illustrations consist of neatly-executed sketches of scenes of interest on the way. The reader can follow the journey accurately from the point-to-point timings of the summer schedules of the 1949 "*Flying Scotsman*," and inside the covers there is a pictorial map in two sections, with the mileages alongside the route. The general contour of the route is shown by a gradient profile diagram.

"PHOTOGRAPHY"

By Arthur Nettleton

(W. and G. Foyle. Price 2/6)

This book, written in a chatty way, is primarily for the newcomer to the photographic hobby, and technicalities have been kept to the minimum. It begins with notes on the different types of cameras and their operation, and passes on to the "how and why" of lenses and shutters; how to obtain correct exposures; the use of supplementary lenses and other aids to good photography; and films and film speeds. Architecture and landscape photography are touched upon, and for those who like to do things for themselves there are instructions on daylight and gaslight printing, on mounting and tinting, and arranging and indexing a film storage album.

Other useful chapters deal with tracing faults in photographs, care and overhauling, and on how to make photography a profitable hobby. The book is illustrated with 14 full-page half-tone photographs.

"MODEL AERONAUTICS"

Edited by B. Dean and R. Warring

(Ian Allan Ltd. Price 2/9 post free)

This new addition to Ian Allan's "*Model Aviation*" series contains details, plans and drawings of 10 model aircraft, which include rubber, glider, and power models, and machines of free flight and control-line types. An article of special value to the newcomer to model aircraft construction explains how to enlarge the plans given in books of this kind to the correct size for working, if you do not wish to purchase the full-size scale plans which are available. Other articles deal with radio control, aerobatic aerofoils, and power model construction, and there are pages of pictures of interesting model aircraft.

"THE RAILWAYMEN'S YEAR BOOK"

By G. Morris

(Railwaymen's Publications Ltd. 2/6)

The 1949 edition of this useful guide seems to us an improvement on its predecessors. It contains a great deal of information that the railwayman requires to have in connection with his job, with many facts and figures, important dates in railway history, and details of various railway organizations, educational schemes and union matters. There are also chapters on the crack trains of Britain and electrification on British railways, and other attractions include a gardening section, with a complete gardener's calendar.

An index completes the tale of the contents of this useful "Year Book," which can be obtained for 2/9, including postage, from Railwaymen's Publications Ltd., Vernon House, Sicilian Avenue, London W.C.1.

New York's Greatest Tunnel

Underwater Highway Over Two Miles Long

EVERY day an avalanche of motor vehicles descends on the business centre of New York from the various boroughs that make up the city, and from even farther afield, and one of the greatest of the many problems that have confronted the authorities there has been that of making this immense traffic easily possible. The chief difficulty is due to the fact that Manhattan, the central borough, is an island. On one side is the broad Hudson River, where are the great piers at which "*Queen Mary*," "*Queen Elizabeth*" and other Atlantic liners are berthed; on the other is the East River, and the Harlem River connects the two at the north end of the island, the southern tip of which faces New York Bay.

Giant bridges and underwater tunnels have been provided, but even these are insufficient to provide for the multitudes of motor vehicles that travel into or from Manhattan, and yet another gigantic tunnel, the largest of those yet built, is now under construction from Battery Point, at the southern tip of Manhattan, under the waters of New York Bay to Brooklyn.

Work on the Brooklyn-Battery Tunnel, as the new highway will be called, began in 1940, but had to be suspended in 1942, and was not resumed until December 1945, following the end of the war. Now it is being pressed forward vigorously and it is hoped to complete the project some time this year. It is in direct line with express highways and parkways in and around New York, making passage by road across the city swifter and easier, and more than 9,500,000 cars are expected to pass through it during the first year of its operation, a figure that will increase to its maximum of 16,000,000 annually in 10 years' time.

The Brooklyn-Battery Tunnel, like the three already existing under the Hudson and East Rivers, will consist of twin tubes, each of which will carry a double line of traffic in one direction. They will have an outside diameter of 31 ft., and between their terminal plazas they will have a length of 11,100 ft., or more than two miles. The distance under land and water between the actual portals will be 9,117 ft., and the tubes will dip to a maximum depth of 125 ft. below mean high water in New York Bay. The actual roadway width in the tubes will be 21 ft. 4 in.

Excavation was started from two points. On the north side, in Battery Park, Manhattan, a shaft was sunk to the required depth and finished with heavy concrete walls, and from its foot the twin bores were driven towards the Bay. The initial headings were 20 ft. by 20 ft. in size, and the two went forward at about the same rate. This section of the work was in rock, but at one point an underwater valley filled with soft ground had to be crossed, and there the men worked in compressed air to exclude water.

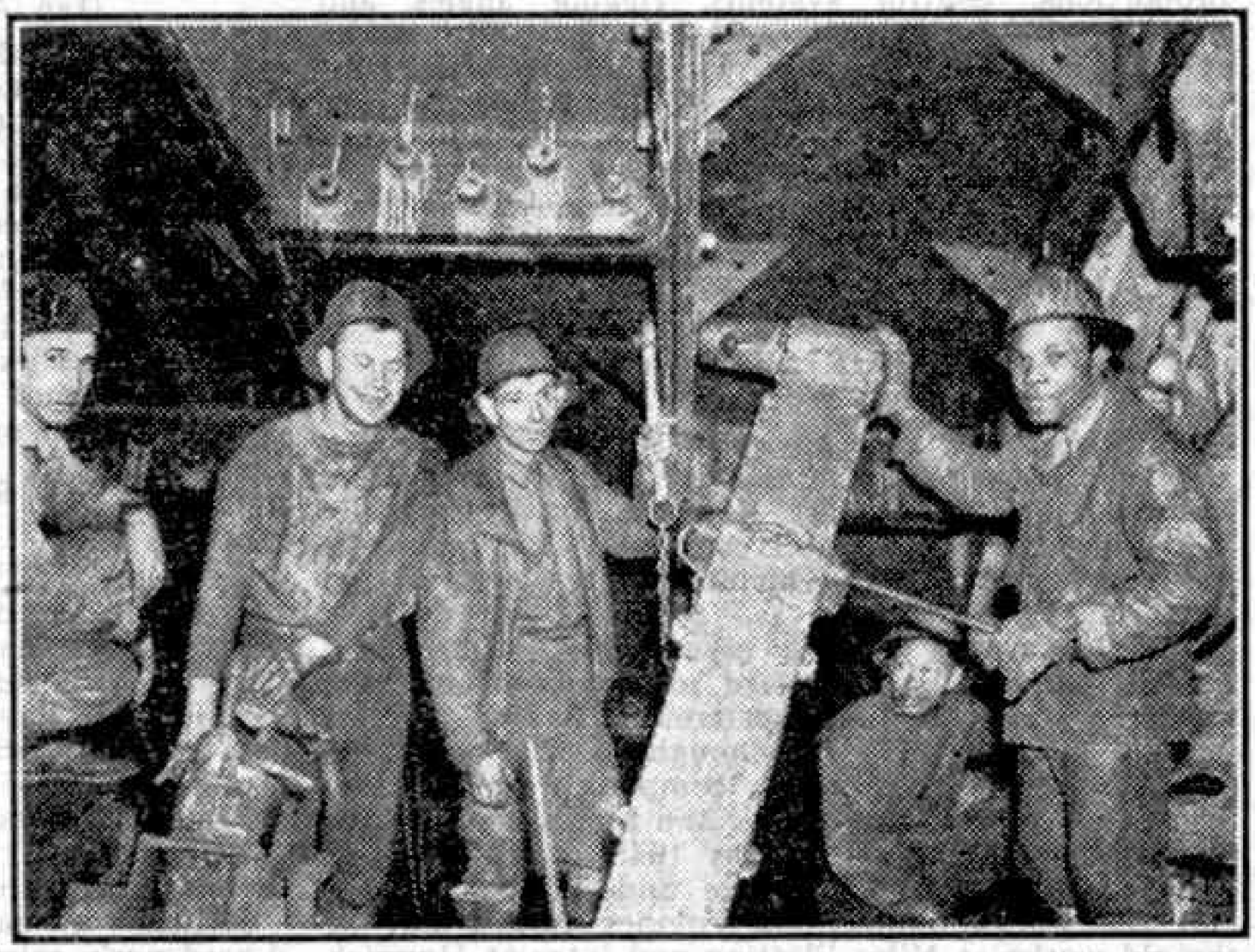
When the headings had been driven 2,800 ft. southward the entry of America into the war stopped further progress, and the tunnel was allowed to flood with the water seeping into it. Three years later it took two weeks to pump out the water so that excavation could be continued.

By March 1946 the two bores had reached a position about half way across to Brooklyn. The pioneer tunnels were then enlarged and the lower surface or "invert" was covered with concrete. The tunnel was lined with cast iron rings, which were bolted together by means of a special mechanism using compressed air. The final stage in the completion of this section of the tunnel will be the concreting of the lining.

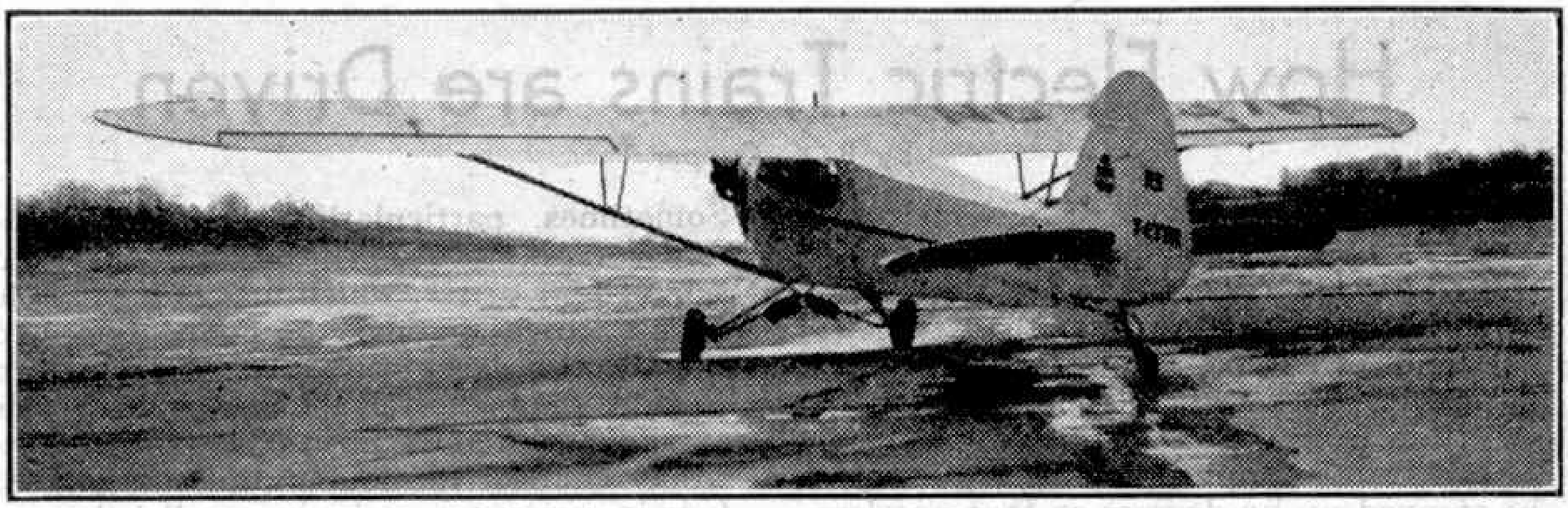
In the meantime boring had commenced from a shaft sunk in Brooklyn, at the south end of the tunnel. This section of the tunnel was driven through soft ground, as the rock bottom of New York Bay dips near the Brooklyn shore. This meant that excavation in the tunnel section had to be carried on in compressed air behind a bulkhead provided with air locks for the passage of men and material. The work was done with huge shields provided with cutting edges, which were pushed forward in stages by hydraulic jacks. Each push gave room for the addition of another segment of the lining, which was then used as the base for the 28 jacks that pushed the shield forward.

Excavation was carried on until a 20 ft. barrier of rock remained between the sections, to be excavated later. A hole was driven through this, and measurements then showed that there was a departure of only $\frac{1}{8}$ in. from the prescribed line.

One of the ventilation buildings of the tunnel is to stand on an artificial island midway along its course. This was made by dumping sand and clay to a depth of more than 50 ft., just enough to bring the top clear of water at high tide. A steel caisson was sunk until its lower cutting edge rested on bed rock, into which it was sealed, and the material inside was removed by dredging. An oblong shaft was then driven down to below the tunnel level. The ventilation building will be octagonal, and will be supported by the shaft walls and eight steel cylinders sunk to bed rock outside the shaft.



Tightening the bolts connecting a cast iron lining segment of the Brooklyn-Battery Tunnel with the one previously placed in position. A mechanism driven by compressed air was used for this purpose. Photograph by courtesy of the Triborough Bridge and Tunnel Authority, New York.



A New Angle on Landing

By John W. R. Taylor

ONE of the chief drawbacks to private flying is the amount of space required to land and take off even a light aeroplane. It is usually fairly easy to clear enough space for a single runway strip; but that is not sufficient if the aircraft owner wants to do a lot of flying, because an aeroplane must take off and land more or less into wind, and thus a single strip is useless whenever the wind is blowing across instead of down it. Even farmers, who are among the most enthusiastic light 'plane users, often find it difficult to spare enough of their valuable land for more than one runway.

The problem is even worse for airline operators, of course, and that is why an airport like Heath Row has to have several runways, all running in different directions of the compass and sprawled over miles of countryside.

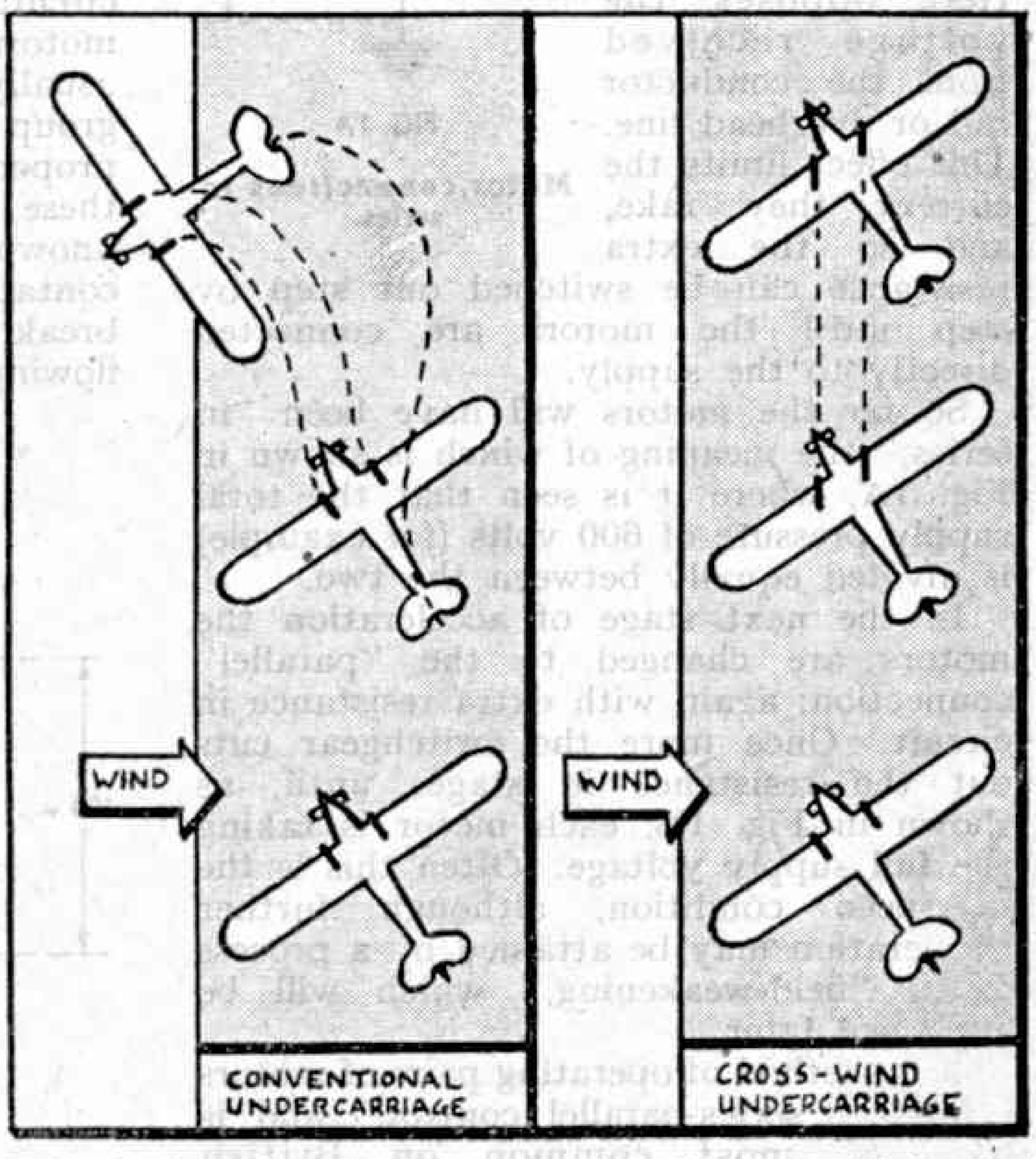
The answer to the problem has always been obvious; in fact Bleriot tried it out on one of his aircraft many years ago. You all know the castering wheels fitted to furniture, which ensure that, no matter which way you push your settee, the wheels are free to turn round until they lie in the direction in which you are pushing. If they were fixed, you would be able to push the settee in only two directions, forward or backward.

The same is true of aeroplanes. Because their undercarriage is fixed rigidly to the airframe, and because the aircraft must take off down the runway into wind, the pilot with a single strip has choice of only two directions for take-off. Now, if we fit castering wheels to the aeroplane, like those on the settee, the whole picture is different. The runway is still fixed and the wheels must run down it, but they are free to turn in relation to the fuselage. As a result, if the wind is off to one side, there is no reason why the aeroplane should not face into wind during take-off, while its wheels caster round and race off happily down the runway.

The result looks a little strange, as you can see in the picture at the top of this page, for it seems that the 'plane is going one way and its wheels another, which is more or less true. But it is quite safe, and means that a private owner, or even an airline operator with only a single runway at his disposal, can now fly almost regardless of wind direction.

It has taken many years to develop an efficient cross-wind landing gear, much of the pioneer work being done in Britain by Mr. O. F. Maclaren. Now the first practical type suitable for production has been put on the market by the American Goodyear Company. It has proved completely successful for most types of aircraft from small personal 'planes to light amphibians and even a "Dakota," and can be obtained as standard fitting on British Auster and American Cessna light aircraft at a cost of £130 in Great Britain.

As well as simplifying runway problems, it has eliminated the danger of ground-looping (being turned over by the wind), which often happened in the past when pilots tried to land their aircraft cross-wind. The castering undercarriage is thus another step towards making flying safe enough and cheap enough for all.



This drawing shows how an aircraft with cross-wind landing gear can land safely in a wind which would overturn one with normal gear.

How Electric Trains are Driven

By B. K. Cooper *

WHEN the motorman of an electric train receives the "right away" and moves his controller handle, he sets in motion apparatus that, more often than not, will carry qut of its own accord all the complex switching processes involved in accelerating the train from standstill to full speed.

The voltage applied to the motors must be stepped up by degrees so that acceleration may be smooth, and to avoid a rush of current that at first would amount almost to a short circuit. Motors at rest present a very low resistance to the passage of current. Some extra resistance must therefore be included in the circuit when power is switched on.

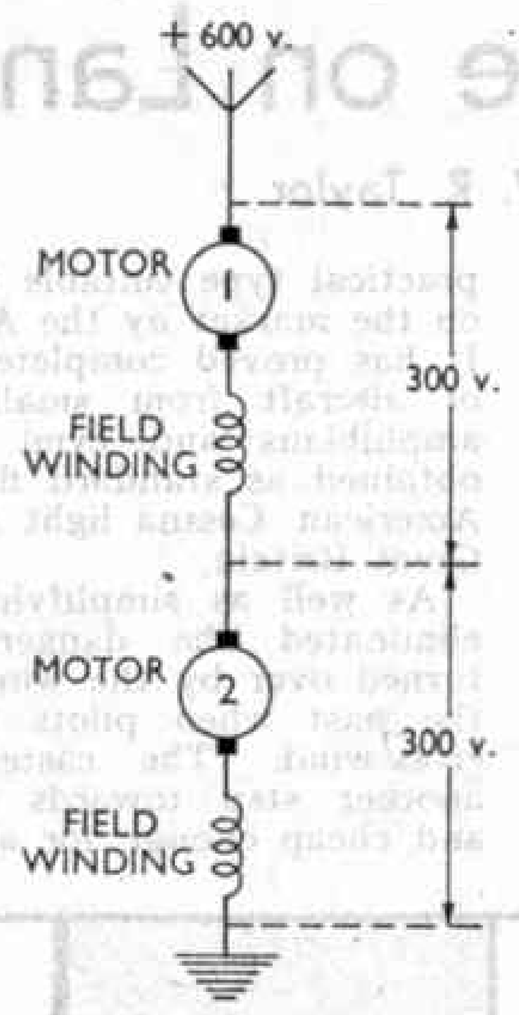


FIG. 1A

Motor connections in series.

As the motors speed up, they develop a voltage that opposes the voltage received from the conductor rail or overhead line. This effect limits the current they take, and so the extra resistance can be switched out step by step until the motors are connected directly to the supply.

So far the motors will have been "in series," the meaning of which is shown in Fig. 1A, where it is seen that the total supply pressure of 600 volts (for example) is divided equally between the two.

In the next stage of acceleration the motors are changed to the "parallel" connection, again with extra resistance in circuit. Once more the switchgear cuts out the resistance in stages until, as shown in Fig. 1B, each motor is taking the full supply voltage. Often this is the full-speed condition, although further acceleration may be attained by a process called "field-weakening," which will be explained later.

This method of operating pairs of motors is called "series-parallel control," and is the one most common on British multiple-unit trains, including tube stock.

Sometimes, particularly in electric locomotives, motors may be controlled in sets of four or six, which makes it possible to use three methods of connection. In the electric locomotives for the Eastern Region, Manchester-Sheffield line, for example, different positions of the controller connect the four motors as follows: four in series; two pairs in parallel (known as series-parallel connection); and four single motors in parallel. An advantage of this arrangement is that in three, instead of two, controller settings all the electrical power is being converted into mechanical energy at the motors instead of some of it being wasted as heat in resistances, so that three efficient running notches (with no resistance in circuit) are provided. The motorman can therefore use these positions, each of which represents a different speed, for as long as he likes, whereas he must run only for a limited time with resistances in circuit because of overheating.

In the early days of electric traction the controller itself made the various circuit changes as it was rotated by the motorman's handle. To-day the controller usually switches a small current so that a group of contactors is operated in the proper sequence as described below. In these circumstances the controller is known as a master controller. The main contacts of the contactors make and break various circuits for the current flowing to the traction motors, and are

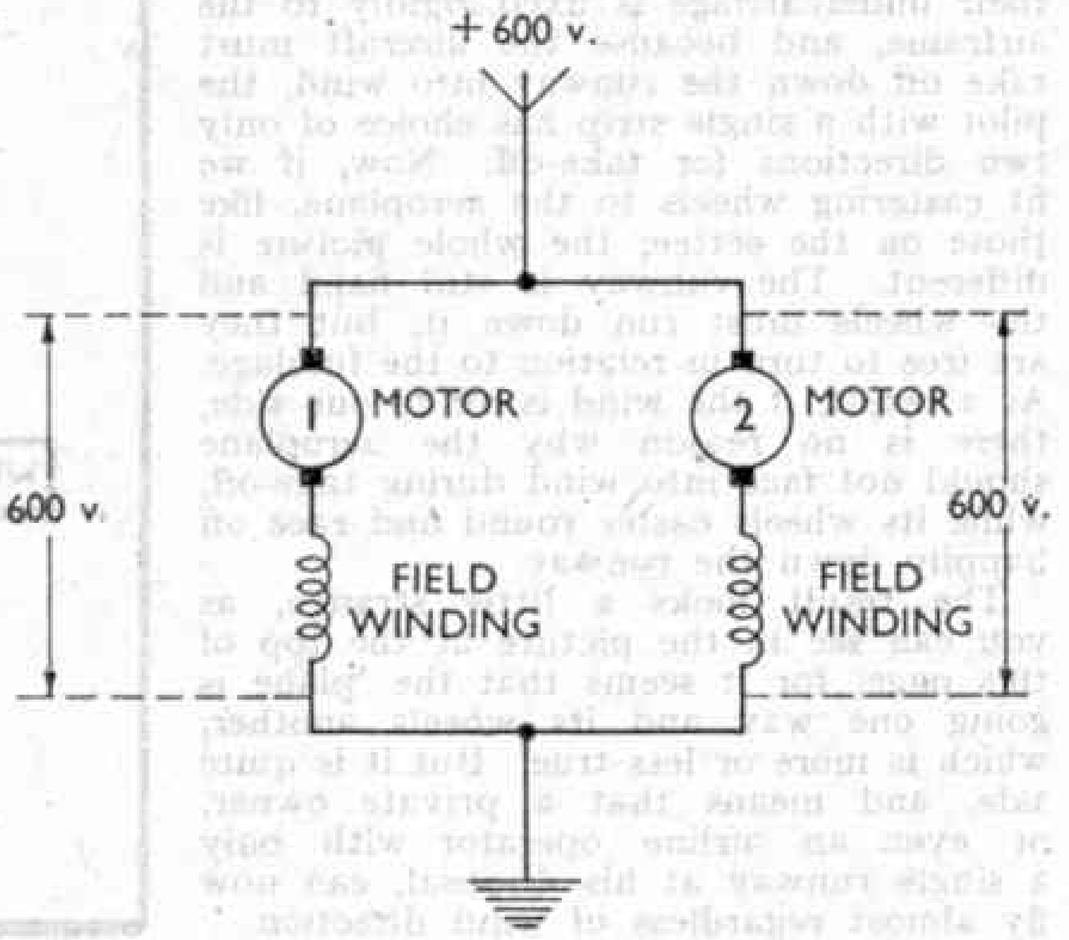
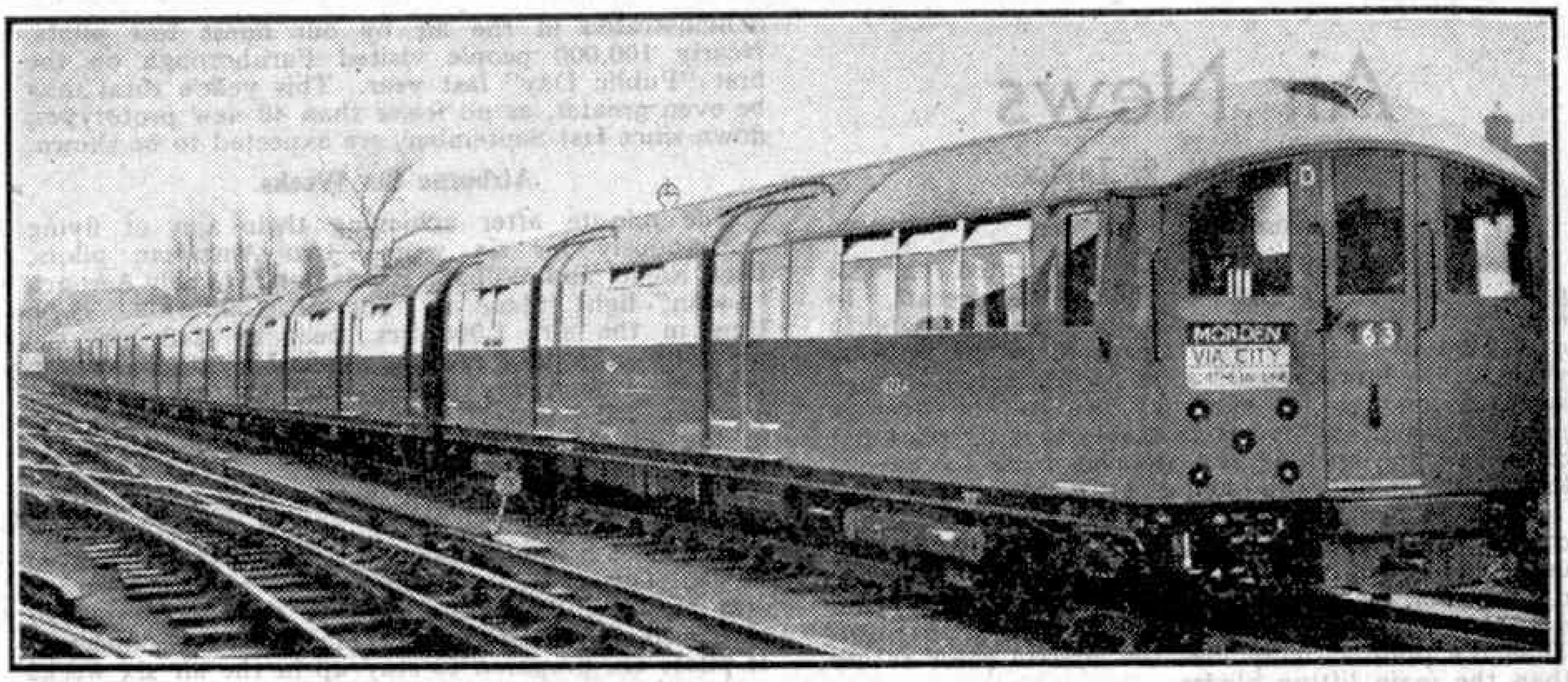


FIG. 1B

Motor connections in parallel.

* *The General Electric Co. Ltd*

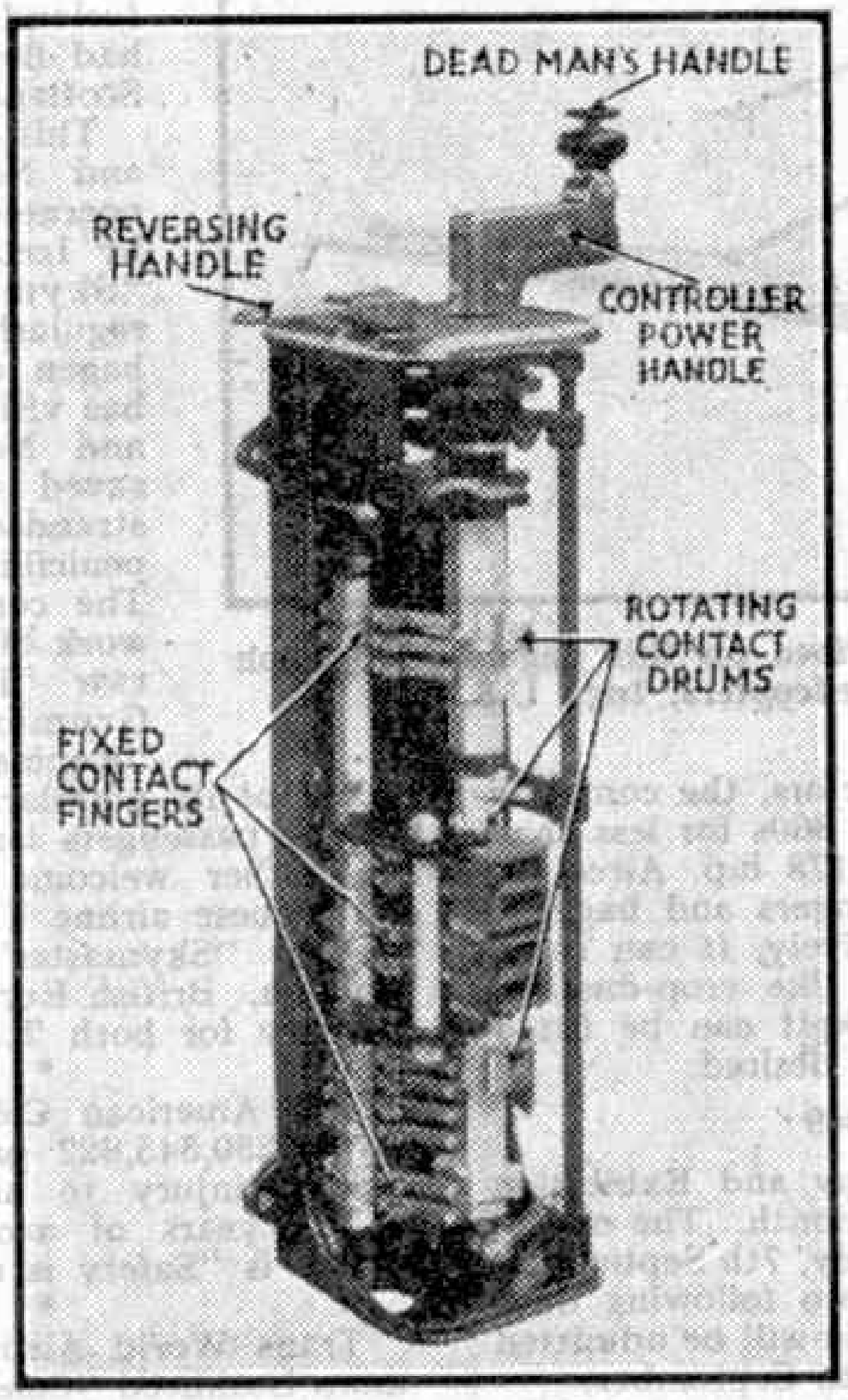


A London Transport "tube" train equipped with camshaft control gear. This is carried on the underframe and leaves the whole of the coach body for passenger accommodation. The illustrations to this article are by courtesy of The General Electric Company Limited.

connected up so that they cut out or switch in the resistances, change the motors from series to parallel, and so on.

Contactors may be operated directly by electromagnets energized from the master controller, or the electromagnets may control air valves that admit a compressed air supply to close the contactor contacts. A third system, found on the latest design of London Transport tube stock, is to work the contactors by means of cams on a camshaft that is rotated by air and oil pressure, the valves governing its movement being operated electromagnetically from the controller.

Whatever system is used, the master controller in the leading motor coach can be connected to the groups of contactors on all the other motor coaches in the train so that all work in unison. This is known as multiple-unit control, the trains being made up of units each consisting of one or two motor coaches and a certain number of trailers. A similar form of remote control may be employed when two electric locomotives are coupled together.



A G.E.C. master-controller with its casing removed. Note the "dead-man" type of control handle.

It is quite common when sitting in an electric train to hear the "click" of the contactors as they operate. Usually in multiple-unit equipment resistance is cut out in some 10 or 12 steps, but this does not mean that the master controller handle need have a corresponding number of positions. Most of the steps occur automatically, and the controller has three or four positions (called "notches") which govern how far the process of automatic acceleration is allowed to proceed.

The foregoing is easier to understand by taking as an example the controller notches and their effect in modern Southern Region suburban stock. They are as follows:

Notch 1. Motors in series and all resistance in circuit.

Notch 2. Automatic acceleration until all resistance has been cut out, the motors remaining in series.

Notch 3. Motors transferred to parallel, and resistance put back in circuit.

Notch 4. Automatic acceleration until all resistance has again been cut out.

At any time while

(*Continued on page 324*)

Air News

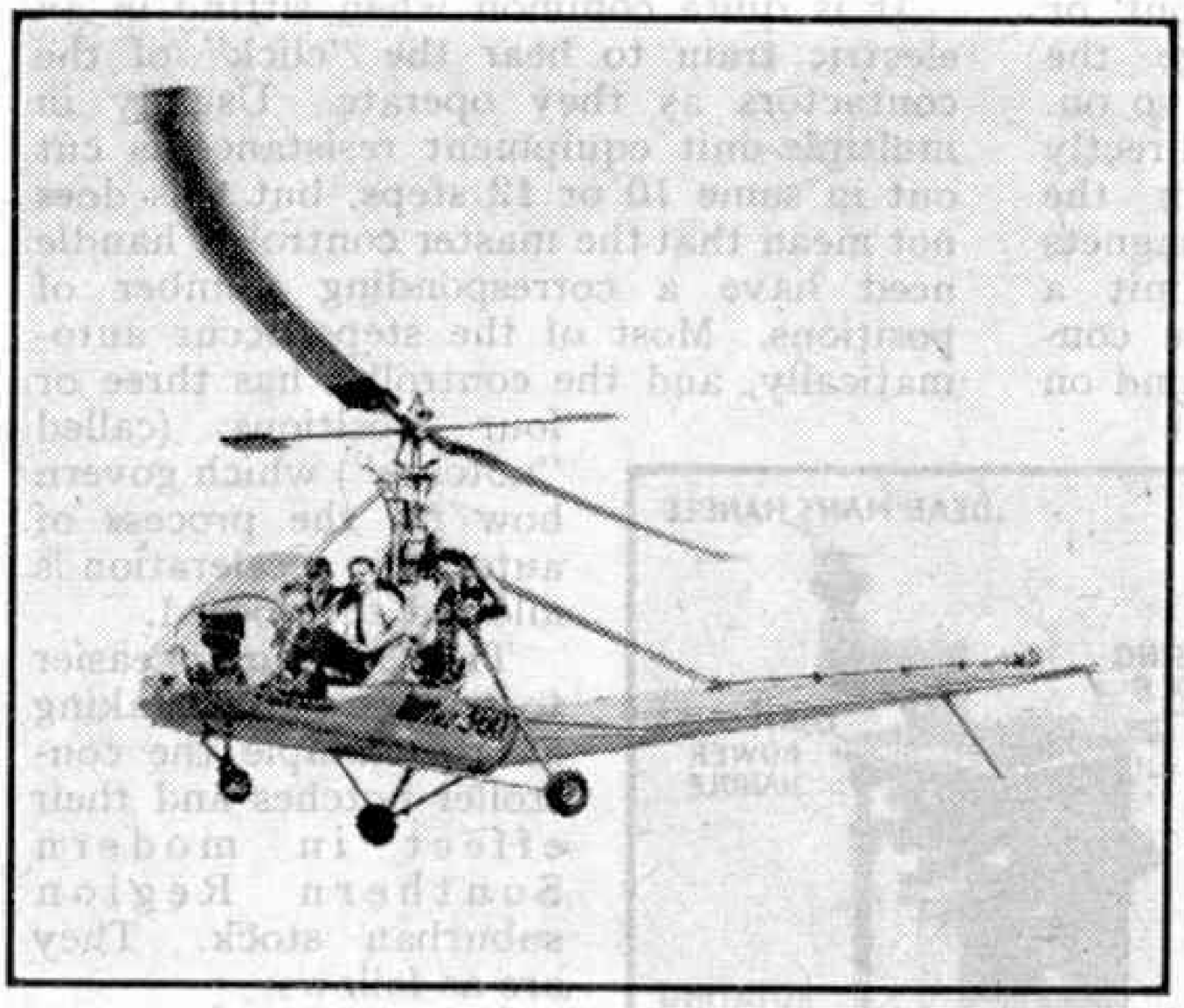
By John W. R. Taylor

A Promising Helicopter

The "Hiller 360" helicopter, illustrated on this page, is in many respects a remarkable aircraft. To begin with its simple controls and inherent stability overcome two of the greatest problems of rotating wing flight—how to build a helicopter simple enough and safe enough for everyday use by the average pilot. In fact, the 360 is so stable that its pilot has often left the cockpit and stepped back to have a look at the engine while flying at several hundred feet!

The main control consists of an overhead "stick" connected to the control rotor, so eliminating the usual cables, pulleys and levers. In turn, the control rotor, which has a small control surface at the end of each of its short "blades," controls the main rotor. Thus the pilot actually flies the control rotor rather than the main lifting blades.

The "Hiller 360" was developed by United Helicopters, Inc., entirely as a "private venture," without any Government support. But by careful design and putting out manufacture of 92 per cent.



The "Hiller 360" helicopter described on this page. Photograph by courtesy of United Helicopters, Inc., U.S.A.

of the aircraft parts to sub-contractors, the company have been able to offer production 360s for less than £5,000 each. It is powered by a 178 h.p. Aircooled engine, and can carry three passengers and baggage for 2½ hrs. at 76 m.p.h. Alternatively, it can carry over 500 lb. of payload on jobs like crop-dusting. Although normally open, the cockpit can be fitted with a complete Perspex cover, if desired.

S.B.A.C. Display 1949

The 10th S.B.A.C. Flying Display and Exhibition will be held at Farnborough next month. The official opening will take place on Wednesday, 7th September, admission on that date and the two following days being by invitation only. The public will be admitted on Saturday, 10th and Sunday, 11th September.

Without a doubt the S.B.A.C. Show is the finest air display in the world, with all Britain's newest civil and military aircraft, engines and components available for inspection on the airfield, and demonstrated in the air by our finest test pilots. Nearly 100,000 people visited Farnborough on the first "Public Day" last year. This year's total may be even greater, as no fewer than 40 new prototypes, flown since last September, are expected to be shown.

Airborne Six Weeks

One minute after achieving their aim of flying continuously for six weeks, two American pilots, Dick Riedel and William Barris, landed their Aeronca "Sedan" light 'plane at Fullerton, California. Their time in the air, 1,008 hrs., beat by 248 hrs. the previous endurance record, which had stood for ten years. Twice a day during their six weeks in the air they had had to come down to within a few feet of the airfield to take aboard fuel, food and water from a fast-moving jeep.

Such a record is normally of little significance, proving only the reliability of the little 145 h.p. engine, which kept running for six weeks without a break. This record attempt, however, was intended also as a publicity campaign to draw attention to the need for better airfield facilities at Fullerton. If pilots are prepared to stay up in the air six weeks rather than land there, the airfield must need a lot of improvement!

Australian Rockets

It is reported that The Fairey Aviation Company will carry out research on anti-aircraft rockets and guided missiles in Australia, in co-operation with the Australian and British Governments. The exact nature of the research cannot be divulged, but it is worth recalling that Faireys designed and built Britain's first radio-controlled, rocket missile, the "Stooge," which was described in the July 1947 *"M.M."*

New Airlines Serve London

A few weeks ago Iceland Airways made airline history by inaugurating the first scheduled air service between Iceland and London. Previously they had flown only as far as Prestwick, in Scotland.

This new service between Reykjavik and Northolt Airport has since been operated once a week in each direction by Iceland Airways' single 40-passenger "Skymaster," which also operates regularly between Reykjavik, Copenhagen and Oslo. On charter flights it has visited Lebanon, Venezuela, Finland and New York, and, last December, saved the life of a Danish scientist stranded in Greenland by dropping penicillin to him when he had pneumonia. The company also operate over a network of internal routes in Iceland, using two "Dakotas," three "Catalinas" a Grumman "Goose," de Havilland "Rapide" and Noorduyn "Norseman." Proof of its popularity is that the company carried 26,000 passengers last year.

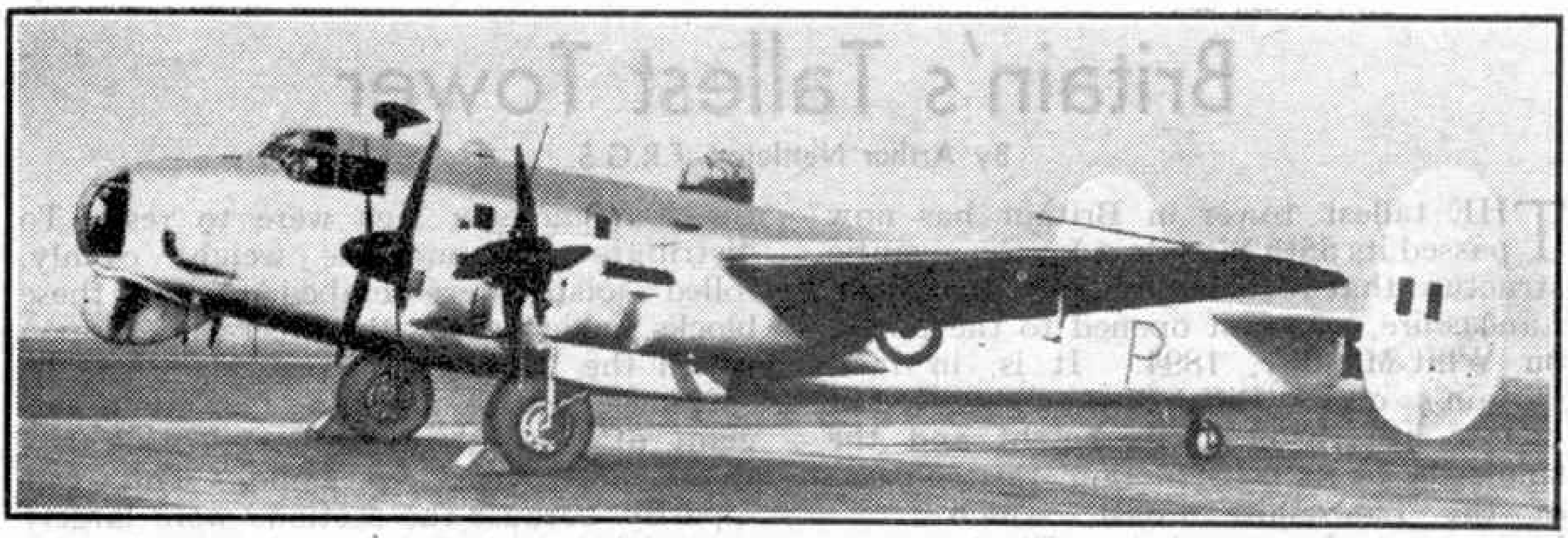
Another welcome newcomer to Northolt is the Portuguese airline T.A.P., which is now operating a weekly "Skymaster" service between Lisbon and London. British European Airways are agents in this country for both T.A.P. and Iceland Airways.

* * * *

The American Colonial Air Lines company have flown 250,545,622 passenger-miles without death or serious injury to any passenger or crew member in 19 years of accident-free flying. The airline's motto is "Safety is no Accident."

* * * *

Trans-World Airline of America have bought 30 more Lockheed "Constellation" air liners, at a cost of £5,000,000. Already the world's largest operator of "Constellations," with 35, TWA will possess the largest standardized fleet of four-engined aircraft in the world as a result of this purchase.



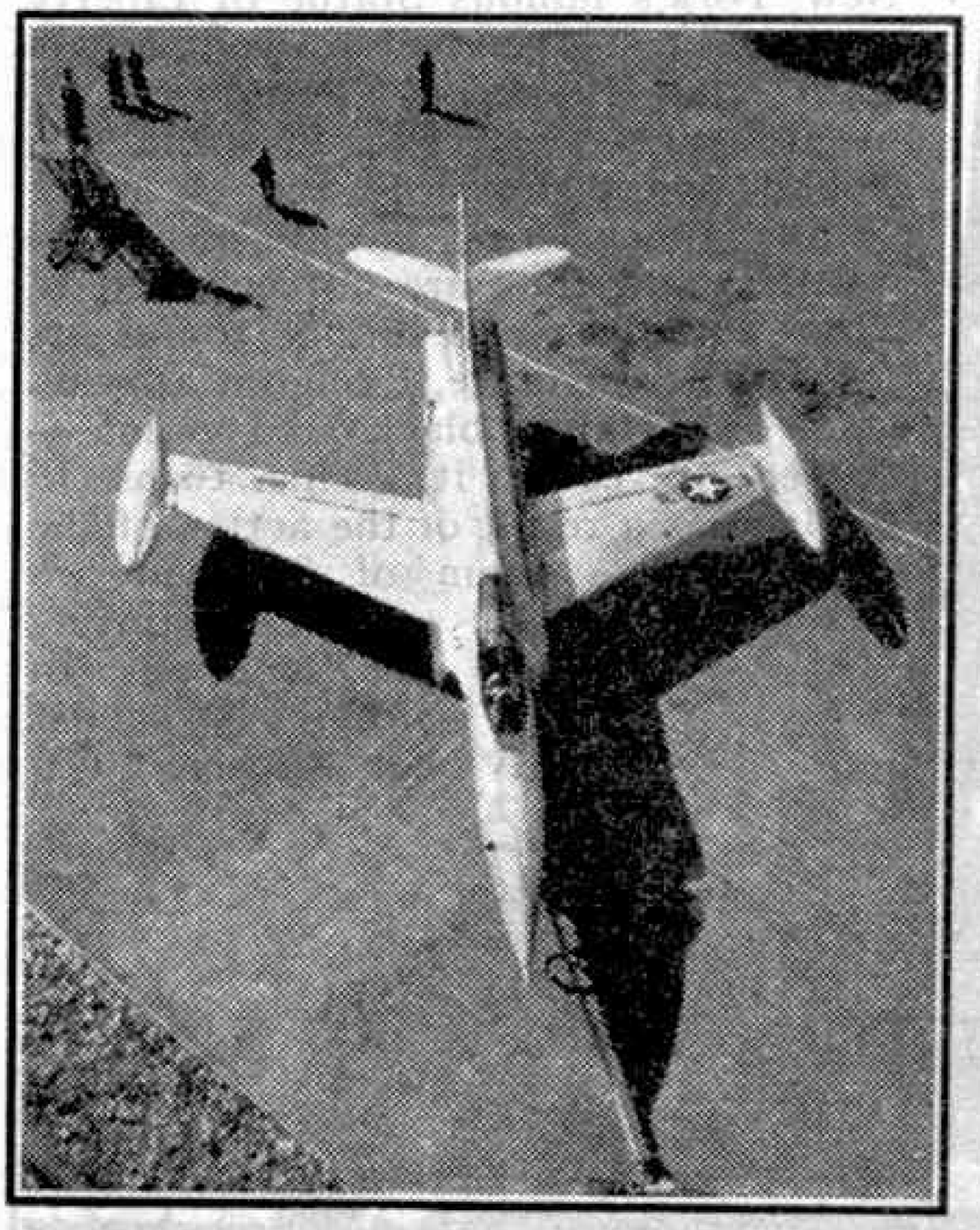
Avro "Shackleton" long-range reconnaissance-bomber, the R.A.F.'s most powerful piston-engined aircraft. Photograph by courtesy of A. V. Roe and Co. Ltd.

The Avro "Shackleton"

The new Avro long-range, over-water reconnaissance-bomber, shown above, has been named "Shackleton," in honour of one of Britain's most famous explorers. It is not a handsome aeroplane, its profusion of propellers and bumps contrasting sharply with the streamlined elegance of modern jet bombers. But the "Shackleton's" job is to search out and destroy submarines and surface raiders, perhaps the most vital of all military aircraft duties, and one which calls for long range and great striking power rather than speed.

The four Rolls-Royce "Griffon" engines of the 'Shackleton," each of which drives a six-bladed contra-rotating propeller, give a total of nearly 10,000 h.p. without entailing the high fuel consumption of jets. This ensures a long range. The "old-fashioned" tail-wheel undercarriage facilitates bomb stowage and also leaves the nose free for installation of the radar scanner and two remote-controlled forward-firing 20 mm. cannons, one on each side of the bomb-aimer's windows. Other defensive armament includes a dorsal turret mounting two 20 mm. cannons and a tail turret with two .5 in. guns.

Coastal Command's "Shackleton" is roughly the same size as the avro "Lincoln," Bomber Command's standard "heavy," to which it bears a strong family likeness. It carries a crew of ten; all other details, including performance, are still secret.



Lockheed F-90 penetration fighter. Photograph by courtesy of Lockheed Aircraft Corporation, U.S.A.

Training the R.I.A.F.

The announcement that a Technical Training College for the Royal Indian Air Force is to be established and operated in India by Air Service Training, of Hamble, is further evidence of India's intention to model its Air Force on British standards and experience.

Both apprentices and technical officers will receive instruction at the college, which will be staffed initially by British personnel, accommodation being provided in the wartime hospital town of Jalahalli, near Bangalore. After five years, however, it is expected that sufficient Indian Air Force officers and instructors will have been trained to take over the work, in new college buildings which are to be put up a short distance away, at Yellahanka.

New Lockheed Fighter

The new Lockheed F-90, illustrated on this page, is the second of the U.S.A.F.'s new "penetration fighters," designed to penetrate deep into enemy territory, seek out and attack specific targets and yet be fast enough and manœuvrable enough to evade defence fighters. First aircraft of this type was the McDonnell F-88, described in the March 1949 *"M.M."*

Powered by two Westinghouse J.34 jet engines, the single-seat F-90 is a large machine, weighing more than a fully-loaded "Dakota." But half of its weight consists of fuel needed to give it a long range for penetration missions. In fact, its fuel alone weighs as much as Lockheed's earlier jet fighter, the well-known F-80 "Shooting Star." The F-90 is armed with six 20 mm. cannons, and special care has been taken to make its structure strong enough to withstand damage it may receive in low-flying attacks on enemy targets.

"Meteors" for "Western Union"

The Government of Denmark have ordered 20 Gloster "Meteor" 4 jet fighters for the Royal Danish Air Force, and deliveries will start soon. In addition Danish pilots and ground crews will receive instruction in Britain in flying and servicing the "Meteor."

This contract is further proof of the intention of Western European countries to re-equip with standard R.A.F. jet aircraft. Belgium has already ordered 48 "Meteor" 4s and three "Meteor" 7 two-seat trainers, Holland, as well as ordering 34 "Meteor" 4s and seven "Meteor" 7s from this country, has arranged for the Fokker Company to build Mark 4s in Holland under licence from Glosters.

Britain's Tallest Tower

By Arthur Nettleton, F.R.G.S.

THE tallest tower in Britain has now passed its 55th birthday, for the gigantic structure that rears itself above Blackpool, Lancashire, was first opened to the public on Whit-Monday, 1894. It is, in fact, Britain's own "Eiffel Tower"—and not merely by reason of its height and the similarity of its construction; this colossus of the Lancashire Coast, which has come to be regarded as Blackpool's "trade mark," owes its origin partly to its French counterpart.

The idea of building such a tower at Blackpool first came to a Blackpool visitor to the Paris Exhibition in 1889. He observed that the Eiffel Tower was an enormous attraction, and the notion of providing his home town with a similar magnet arose in his mind. Two years later a company to carry out the project had been formed, and the foundation stone of the Blackpool Tower had been laid. £65,000 was spent on acquiring the necessary land, together with the property standing there, and Lord Mayors and Mayors from various Lancashire and Yorkshire cities and towns attended the stone-laying ceremony.

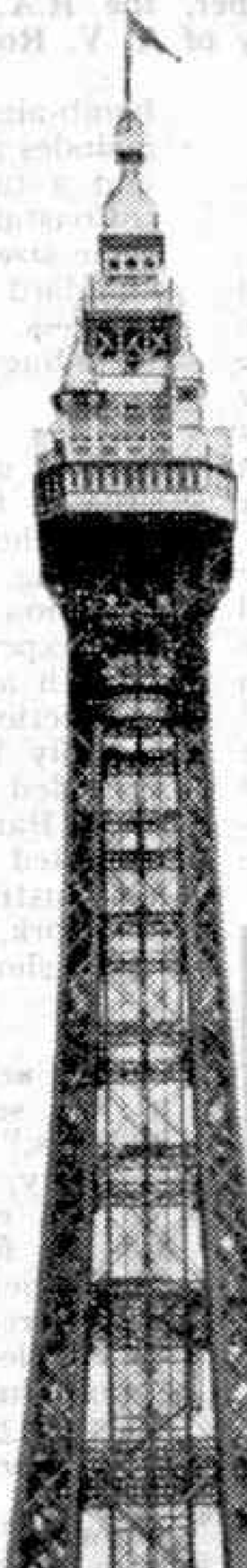
The erection of the structure then went forward rapidly, though it was an enterprise of a kind never before tackled in this country. First a thick layer of boulder clay was provided, and a huge concrete block, 35 ft. square and 12 ft. thick, was placed in each of the positions on which the four monster legs were to rest. To distribute the immense weight evenly, rolled joists were embedded in these blocks, which carry the steel plates upon which the base girders rest.

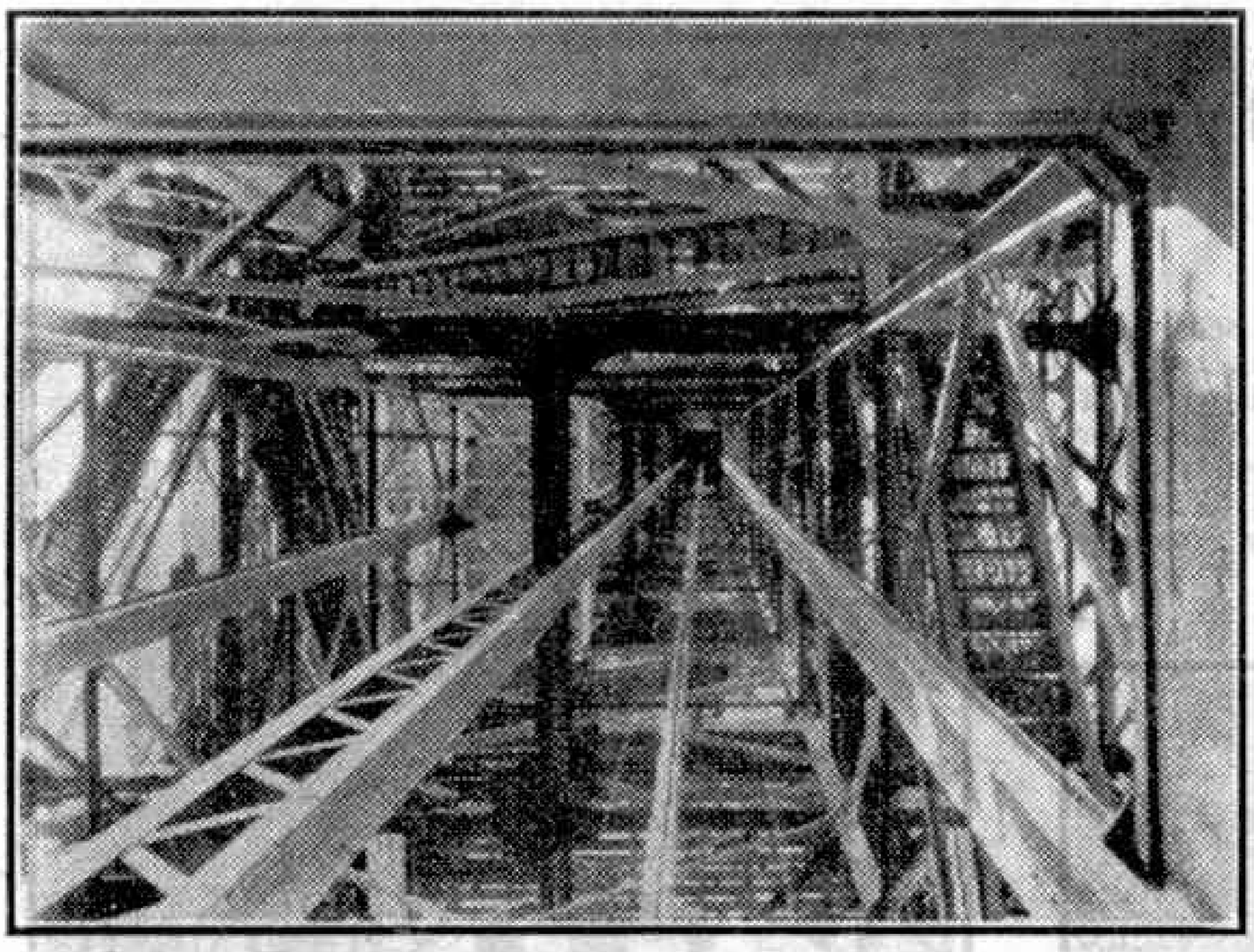
Not the least astonishing fact about this giant of Lancashire is that it took less than three years to build. This was partly because the sections were largely pre-fabricated and brought to the site ready for bolting together.

The tower, with its lifts and other appurtenances, weighs more than 2,500 tons, 2,493 tons of steel and 93 tons of cast iron being used by the builders. With the buildings round the base, it covers an area of more than 6,000 square yards.

Nowhere else in Britain can you climb so far above ground level. Blackpool Tower has to concede nearly 500 ft. to the Eiffel Tower, yet its height of 518 ft. to the top of the flag pole gives it the record for Great Britain. It is 202 ft. higher than the Clock Tower of the Houses of Parliament, and 153 ft. higher than the cross on the dome of St. Paul's Cathedral. New York's famous Statue of Liberty seems almost a midget by comparison with the Blackpool structure, for it measures only 305 ft. from the foundation pedestal to the torch.

Blackpool Tower has its own curiosities, and they are not confined to the aquarium and circus round its base! For instance, though it appears to be painted black, red paint is used to cover it. This turns to black as a result of the action of the sea air. A team of 30 men are continually at work painting the hundreds of girders. No sooner has it been given





Looking up the lift shaft of the Blackpool Tower. Hydraulic power is used to run the elevators.

a complete coat than the job is started again. Constant supervision and repair work keep the structure safe. The engineers and painters require steady nerves and often have to do their job in a stiff wind.

This British skyscraper — it is nearly half as high as the Empire State Building, New York, and as high as some of the other skyscrapers there—is outstanding not only for its dimensions, but for the extensive views it affords as well. Objects and places more than 50 miles away can be seen from the crow's nest, 480 ft. above the ground. From this eyrie, which is covered with white and coloured glass, beacons on the Lakeland mountains and Pennine heights have been seen. Incidentally, the Tower itself became a beacon one day while it was being built, the top catching fire!

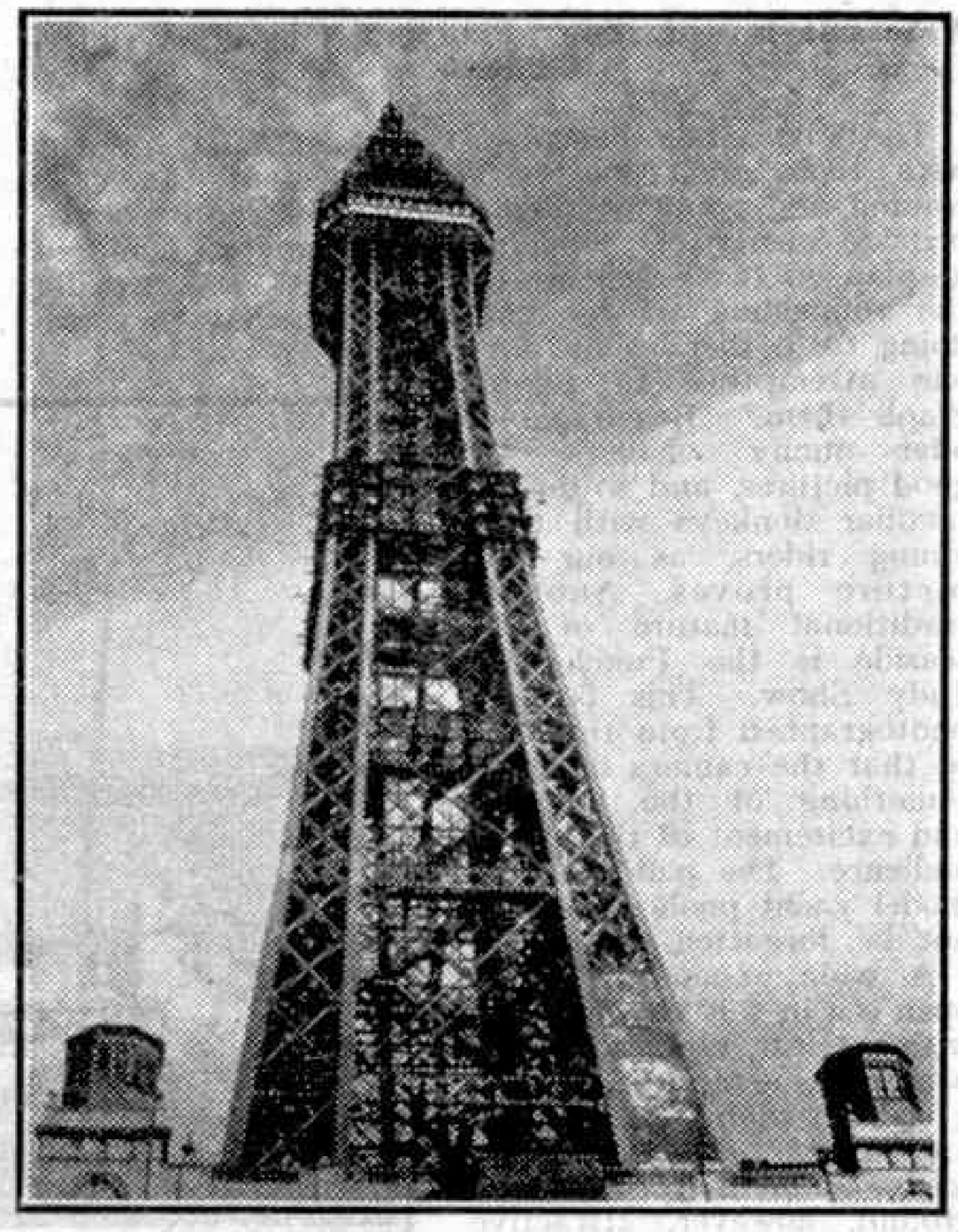
Hydraulic elevators run from the central hall to a point 100 ft. below the crow's nest. Above the latter viewpoint the visitor may climb to platforms at 400 ft. and 420 ft. by stairs and ladders. Superb panoramas are obtained from these points, the prospect including a long stretch of the Lancashire Coast, the peaks of the Lake District, the villages of the Fylde area, and the Pennine Range.

A radio broadcast took place from this elevated spot in August 1946, when the Tower was re-opened to the public after being closed during the war. There was good reason for that closure. In the late conflict the Tower was used as a radar base. It had the further unique distinction of being illuminated during the black-days, a light being kept burning at the top for the safety of aircraft. During World War 1, submarine "spotters" manned the crow's nest, keeping watch for any enemy underwater craft that might venture towards the Lancashire Coast.

Though this giant structure is not as high as the skyscrapers of New York, in one way it does score over them. On Blackpool Tower you are on top of a single spire, with the next highest buildings far below; at New York the scene is obscured by other skyscrapers.

The circus for which the tower is famous is built between the four supports of the structure. This entertainment centre, which can accommodate 3,000 people, was opened on the same day as the Tower itself.

A novelty of the arena is that the ring can be flooded, thus forming a pool for water spectacles. This centre for "spangles and sawdust" entertainment, indeed, has often led the way for such shows throughout the world.

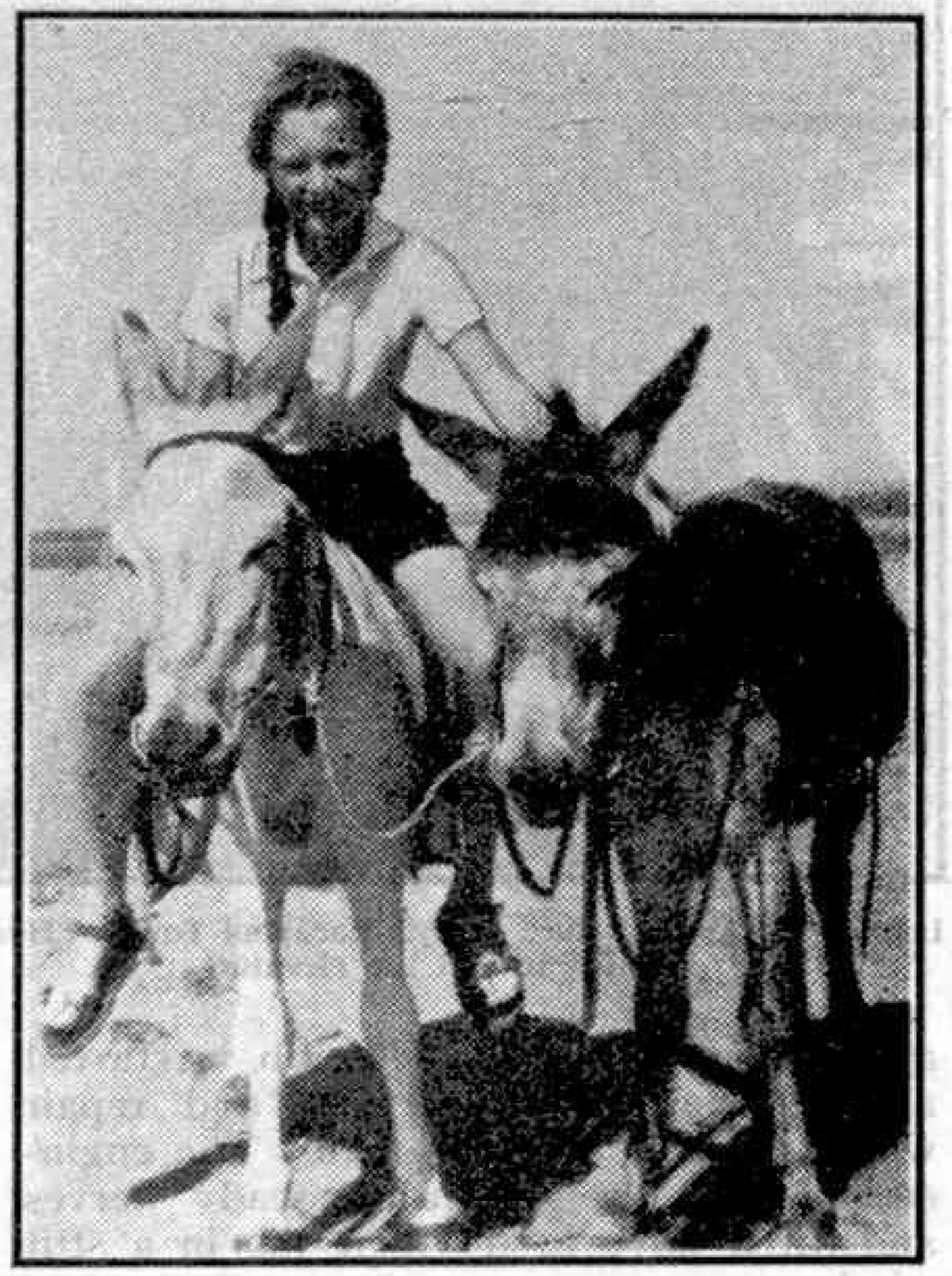


A close-up of the Blackpool Tower, showing the intricate construction. The platforms half-way up are for the use of the maintenance staff.

Photography

At the Seaside

READERS who are on holiday at the seaside will find a fascinating variety of subjects to photograph. Most of these subjects will be well within the scope of the cheapest cameras, as even when there is not actual sunshine the light by the sea is usually strong enough for snapshots of all kinds. This does not mean, however, that the exposure meter or calculator should be ignored.



On the Sands. Photograph by S. Sebba, London N.20.

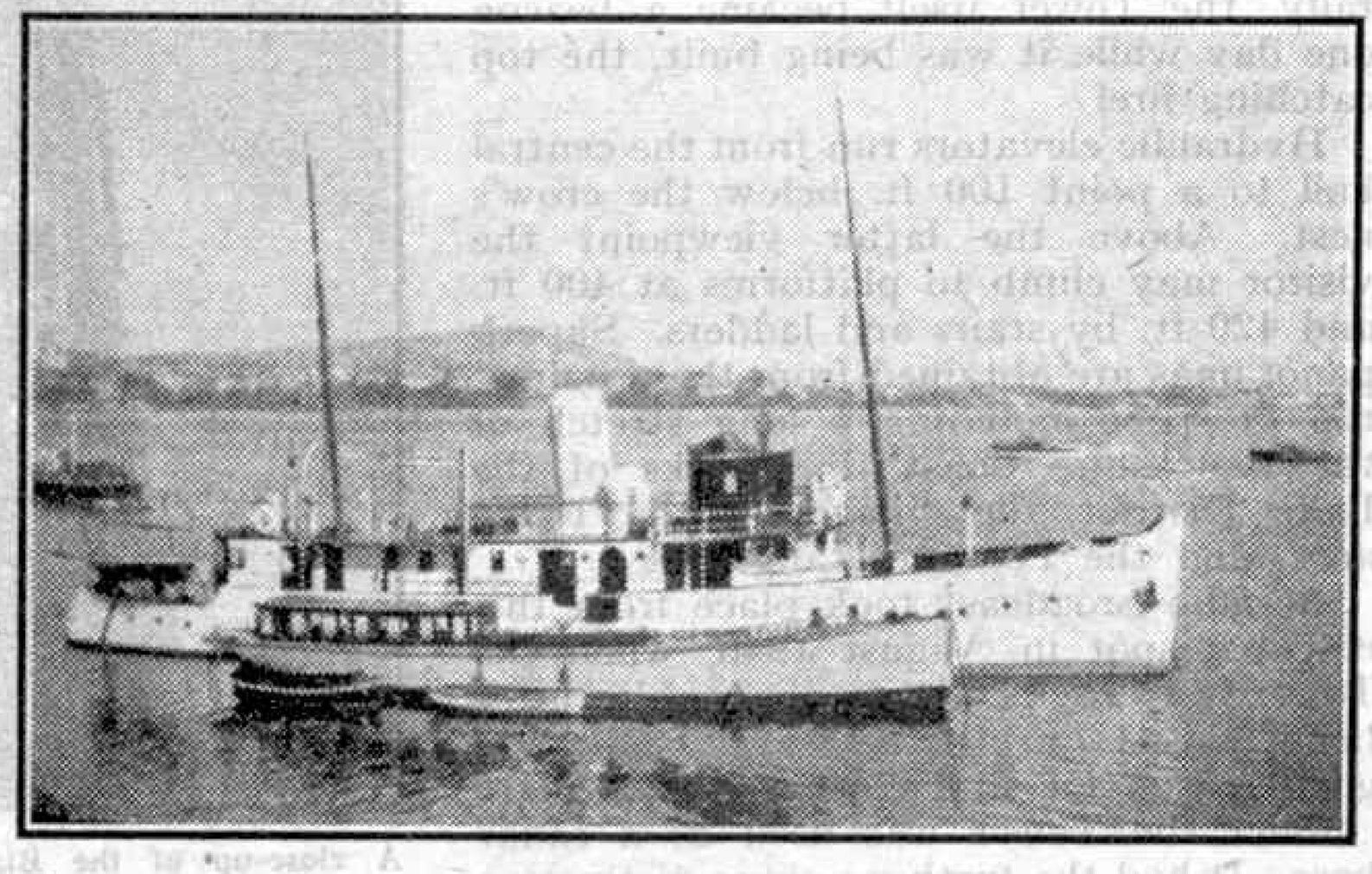
popular subjects and worth taking a good deal of trouble to obtain. Here again some kind of foreground is essential for a good picture.

Waves breaking on the shore are always a tempting subject. Many pictures of this kind fall short of expectations by being taken from a high viewpoint; this has the effect of "flattening" the waves and making them appear insignificant in size. The camera should be held low down; the lower it is the bigger will the waves appear to be. Do not point the camera straight at the incoming line of waves, but photograph it at an angle. If possible choose a part of the shore where there are rocks on which the waves break with a great display of foam.

A Seaside Investigation. Photograph by R. Wrigley, Clitheroe.

The long sandy beaches at many popular resorts, with their great variety of amusements and the coming and going of small sailing and motor boats, provide plenty of scope for one's camera. Children at play on the beach are ideal subjects, as generally the youngsters are too engrossed in what they are doing to bother about anyone attempting to photograph them. Beach games offer many chances for good pictures, and so do the familiar donkeys with their young riders, as our top picture proves. Another traditional feature of the seaside is the Punch and Judy Show. This is best photographed from the side, so that the camera captures something of the laughter and excitement of the young audience. The paddling and model yacht pools also must not be forgotten.

A wide expanse of calm open sea in full sunshine and with a clear blue sky overhead looks delightful, but as a photograph it is disappointing. If there are rocks or boats in the foreground, however, attractive pictures are easily obtainable. Sunsets viewed from the beach or promenade are



Boats on the Conway Estuary, North Wales. Photograph by C. C. Dixon, Wilmslow.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

THE LADDER BICYCLE

The Ladder Bicycle seen in the accompanying illustration was one of those purely freak machines that make their appearance from time to time, the rider sitting about 8 ft. above the road. As far as I could ascertain it was of no value for utilitarian cycling, but no doubt it has its advantages for publicity, for when ridden it attracted a great deal of attention.

This is by no means the first example of a real high bicycle, for I have a photograph, taken about 1890, of a freak tandem known as "The Eiffel Tower," on which the front rider was seated over 12 ft. above the ground. I understand it was actually ridden in London streets on several occasions, probably as an advertising stunt.

C. R. Rowson (Liverpool).

A freak bicycle, on which the rider is about 8 ft. above the road. Photograph by C. R. Rowson, Liverpool.

A SIGN OF THE TIMES

The Ship Inn at Morecombelake in Dorset boasts a sign of the times, illustrating change. On one side of the signboard is an old-time sailing ship, and on the other a modern liner, as the accompanying illustration shows.

I once noticed a comparable sign in Berkshire. On one side of this a plough was being pulled by horses, and on the other by a tractor.

J. D. U. Ward (Abingdon).

THE PARIS UNDERGROUND

The first section of the Metro, or Metropolitan Railway, the underground system of Paris, was built when an Exhibition was to be held in the city in 1900, and because of its success the line was extended and became a permanent means of travel. Trains through its tubes run at intervals of 2½ min., and travel on it is inexpensive, a single ticket which enables one to travel anywhere on the system costing only 2½d.

There are 14 lines, which run from one side of the city to the other. They form a sort of network and pass beneath the Seine several times. The route mileage is over 80. The track is double throughout, and stations are frequent, giving access to any place in the city. The largest are Etoile, Chatelet and Nation, but at all of them the platforms can take trains of five vehicles. Most of them have white tiled roofs, and many advertisements, and all are simple, without frills or decorations.

The trains consists of four or five coaches, and take current from a third rail. The interiors are painted cream, with wooden seats for 20 people, and standing room for nearly 80. Doors have to be opened by hand, but close automatically. There are only two classes. The first-class cars are painted bright red and second-class ones green. Speeds are not so high as in the London tubes.

The tunnels were originally light grey, but through many years of use they have turned black. There are lights on one side at frequent intervals, and cables on the other.

M. J. Rogers (Salisbury).

An inn sign that tells a story. It is at Morecombelake, in Dorset, and the other side shows an old-time sailing ship. Photograph by J. D. U. Ward, Abingdon.

THE "LUCY ASHTON"

The former North British Railway Clyde passenger steamer *"Lucy Ashton"* celebrated her diamond jubilee last year. She was launched on 24th May 1888 from the yard of T. B. Seath and Co., Rutherglen.

The *"Lucy,"* as she came to be known, is a passenger paddle steamer, 190 ft. long and 21 ft. 1 in. wide. She was built with short saloons fore and aft, and with large paddle boxes bearing at the centre a carved head of Lucy Ashton set in gold relief. The steering wheel, worked by hand, was on the promenade deck between the paddle boxes. In later years a bridge was erected with a steering wheel and binnacle. She appeared first on the Holy Loch run, and became associated with the Gareloch and Greenock Ferry service.

In 1902 the original engine was removed and a compound diagonal engine was fitted, with a high pressure boiler (110 lb.). In the following year her saloons were renovated and extended, and she was also given new paddle boxes, which were slightly smaller than before.

During the first world war the *"Lucy"* remained on the Clyde to maintain the necessary services when most of her contemporaries had departed, and by 1939 all the younger vessels were on war service, leaving the "Old Lady" to carry on the work by herself once more. She ran summer and winter, with only a total of a week off for overhaul, and from 3rd September 1939 to 8th May 1945 she steamed 143,297 miles and carried 1,128,258 passengers.

"Lucy" celebrated her diamond jubilee year by being nationalized, for on 1st January 1948 she was taken over by British Railways. To the people of Craigendoran the "fine old lady" is "worth her weight in gold."

J. S. Buchanan (Port Glasgow).

Among the Model-Builders

By "Spanner"

JIB RADIUS INDICATOR FOR MODEL CRANES

The load capacity of a jib crane varies according to the angle at which the jib is working, for as the jib approaches the horizontal position there is an increasing tendency for the crane to overbalance. To prevent dangerous accidents and speed up luffing movements a radius indicator is sometimes fitted to tell the operator at a glance the position of the jib, and the maximum load that he can handle safely without increasing its angle.

A radius indicator of this kind built in Meccano is shown in Fig. 1. It consists of a Coupling 1 that is free to turn about the 1½" Rod 2, which is gripped in the boss of a Crank 3 bolted to the upturned flanges of the jib girders.

The Coupling carries in its upper end a further 1½" Rod 4, and in its lower end a 1" Rod on which is secured the Worm 5. The weight of the latter serves to keep the Rod 4 always vertical, no matter in what position the jib is placed. A dial 6, which may be shaped from a piece of stout cardboard, is bolted at 7 to an Angle Bracket attached to the jib.

The Rod 2 passes through a hole in the dial and carries two or three Washers to space the Coupling 1 away from the card so that the Worm 4 clears the edges of the girders forming the jib.

When an indicator of this type is fitted to a model crane, the jib should be placed in different positions and the radius of the circle of travel of the load hook for each position of the pointer, marked on a card.

If desired, the pointer can be made to operate an electric switch when it reaches the maximum radius mark, so as to set in motion either an audible warning signal such as a bell, or a relay by means of which the Motor is switched off automatically to prevent damage to the crane.

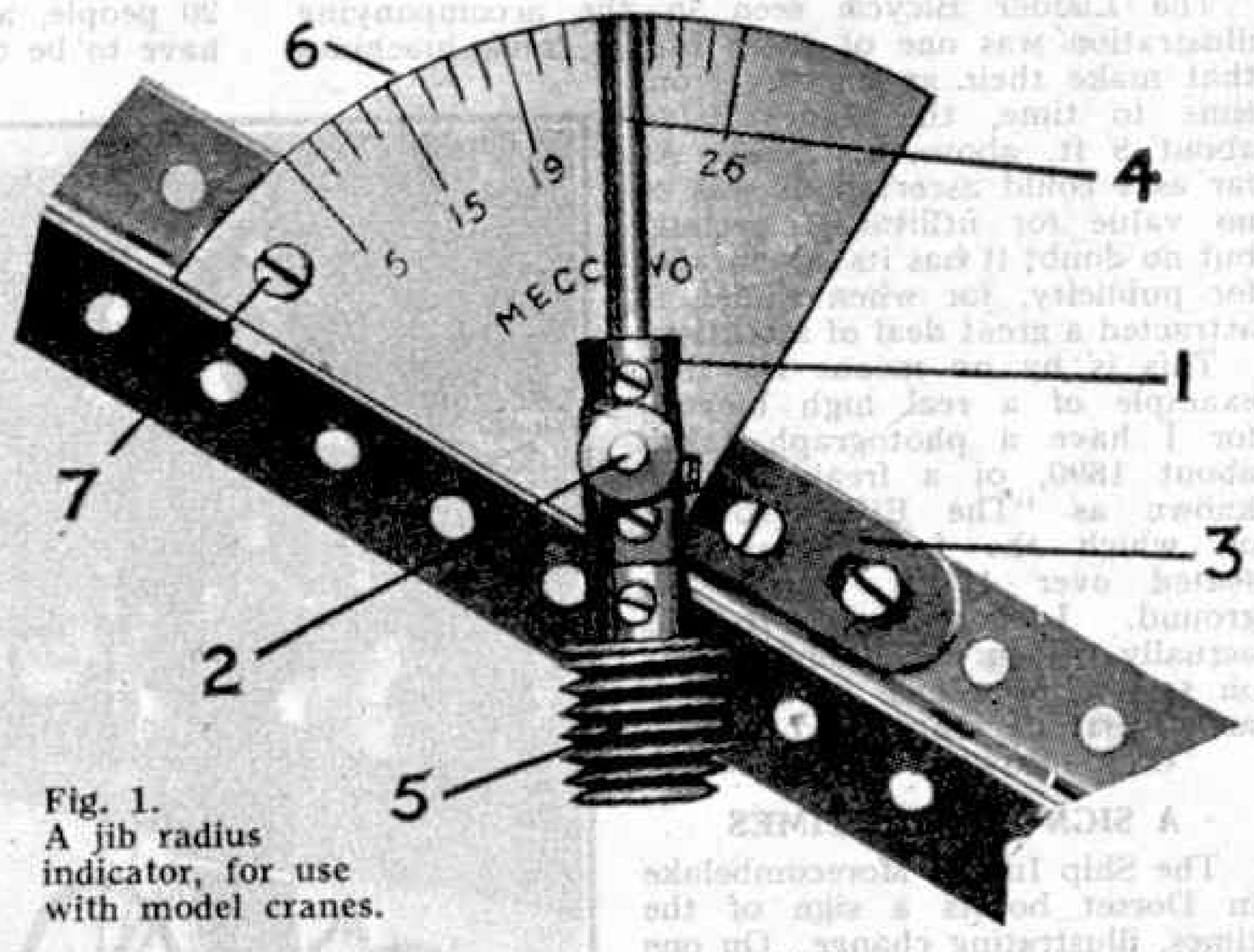


Fig. 1. A jib radius indicator, for use with model cranes.

HOW TO USE MECCANO PARTS

Ball Bearing, Complete (Part No. 168)

The complete Ball Bearing consists of three sections, namely one Flanged Ball Race, one Toothed Ball Race, and one Ball Cage complete with Balls. Fig. 4 shows how the complete Ball Bearing can be used in the construction of a small crane. The Flanged Ball Race 1 is secured to the Flanged Plate 2, and the Toothed Ball Race 8 is fastened to the swivelling structure. The Ball Cage is placed between these two parts so that the Toothed Ball Race rests upon the Balls. A short Rod, passed through the centre of the Ball Races 1 and 8 and maintained in its position by Collars, holds the unit together. The superstructure is rotated by means of Sprocket Chain passed round the teeth of the Toothed Ball Race 8 and engaging a 1" Sprocket Wheel 3, which is secured to a driven Rod 4.

It is sometimes desirable to substitute spur gearing for the sprocket driven ball race already described. A suitable way of obtaining this is shown in Fig. 2. In this example the place of the Geared Ball Race is taken by a 3½" Gear Wheel 2. The Gear is screwed to the base of the model by four ½" Reversed Angle Brackets 4 that rest on the longitudinal Girders 3.

Slewing of the crane is accomplished by securing a ½" Pinion 5 to the end of a Rod that may be driven, at will, from the gear-box. The Pinion meshes with the 3½" Gear.

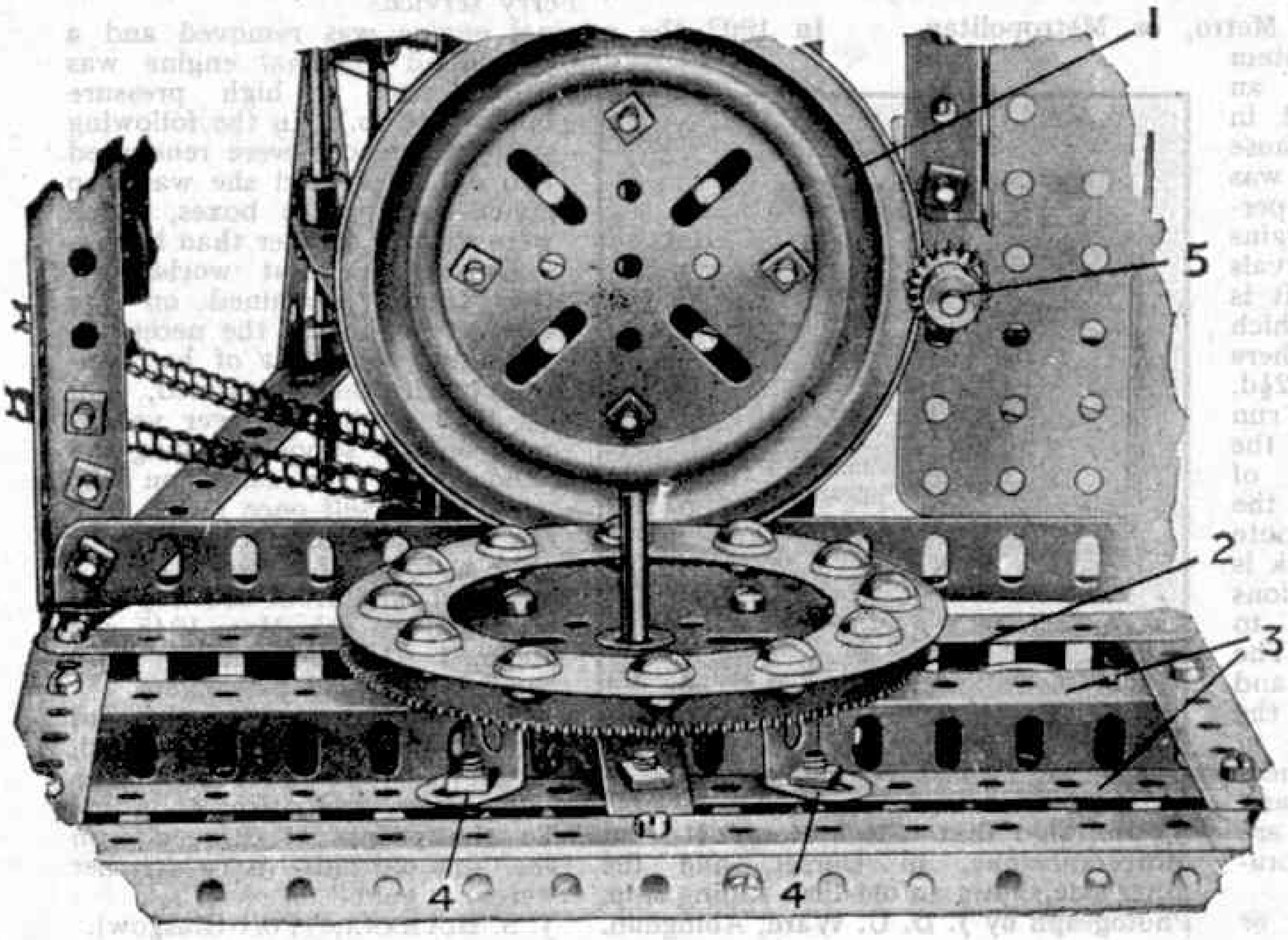


Fig. 2. The Meccano Ball Bearing fitted to a model crane, showing the method of drive to the swivelling jib.

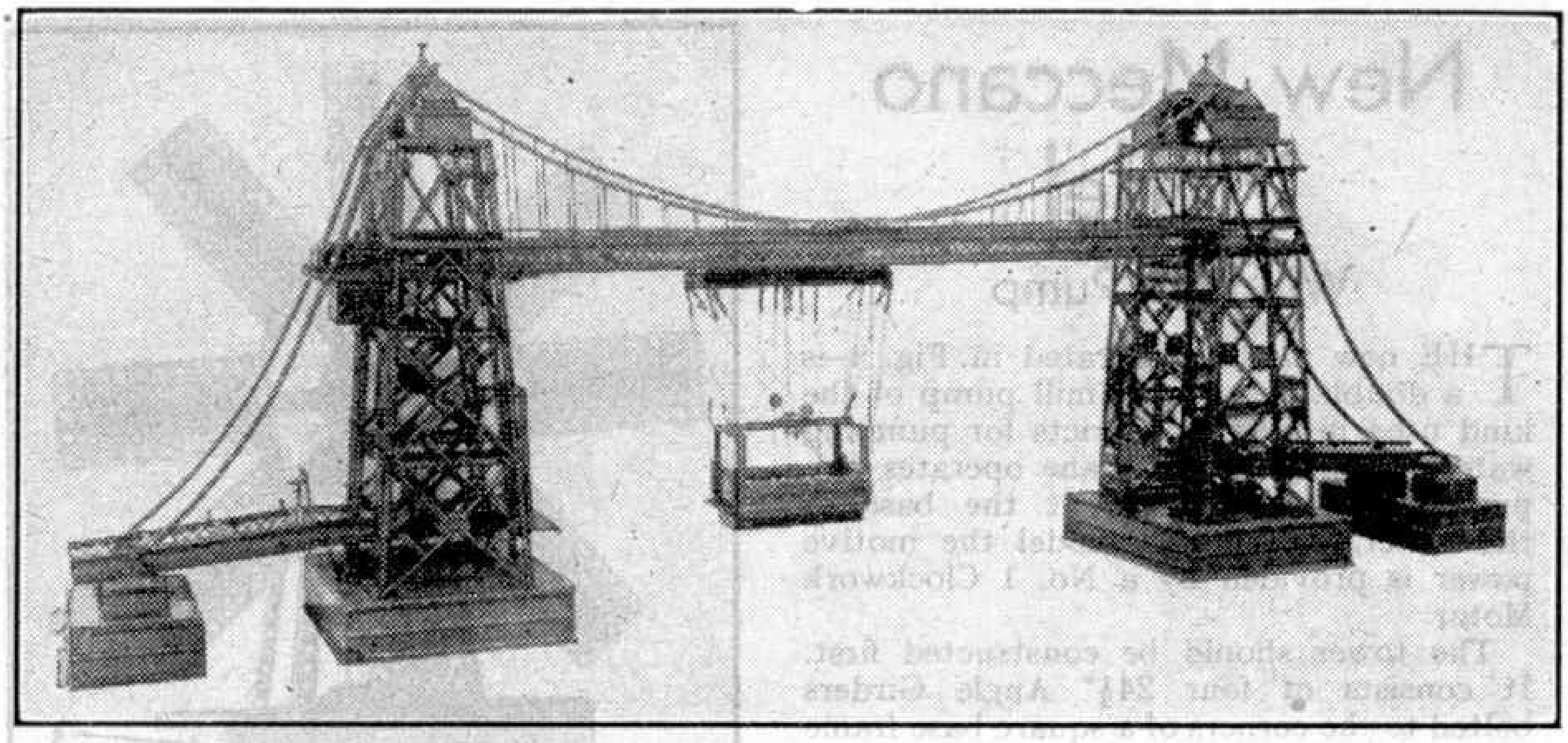


Fig. 3. A 14 ft. model transporter type bridge, which was a great attraction at the 1949 British Industries Fair. Some details of the model are given on this page.

MECCANO AT THE B.I.F.

One of the attractions at the British Industries Fair at Olympia, London, this year, was an imposing model of a transporter type bridge, which was a prominent feature in the exhibits of Meccano Ltd. This interesting model, which is shown on this page, is one of the largest ever built in Meccano, and it worked continuously throughout the Fair.

The model resembles the famous Transporter that spans the River Mersey between Runcorn and Widnes, but it differs from this in the design of the towers. It is 14 ft. in length, and the towers are nearly 5 ft. in height. Each of the great suspension chains that support the span is built up from 500 Strips and weighs 10 lb. The transporter car is capable of carrying a load of 15 lb., and during the period the Exhibition was open it travelled a total distance of nearly 10 miles!

The model is driven by a high voltage motor, and is equipped with 30 electric lamps operated from the mains through Meccano Transformers. There are also lights in the Transporter car, and these are supplied from batteries housed in a special recess provided in the base of the car. Nearly 5,000 nuts and bolts are used in the construction of the model.

The car slowly traverses from one end of the bridge to the other, and after a pause of 15 seconds at each pier it commences its return journey. The mechanism by means of which this automatic reversing is effected proved a fascinating attraction at the Fair. The car and the approach roadways are fitted with rising and falling gates that open automatically as the car arrives at the piers and remain open during the 15 seconds pause before the car travels in the opposite direction. The gates close as soon as the car leaves the piers. The mechanisms operating the automatic reverse and the gates are simple, and proved outstandingly reliable throughout the length of the Fair.

Readers of the "*M.M.*" may be interested to know that the model was built by "*Spanner*" and his colleagues.

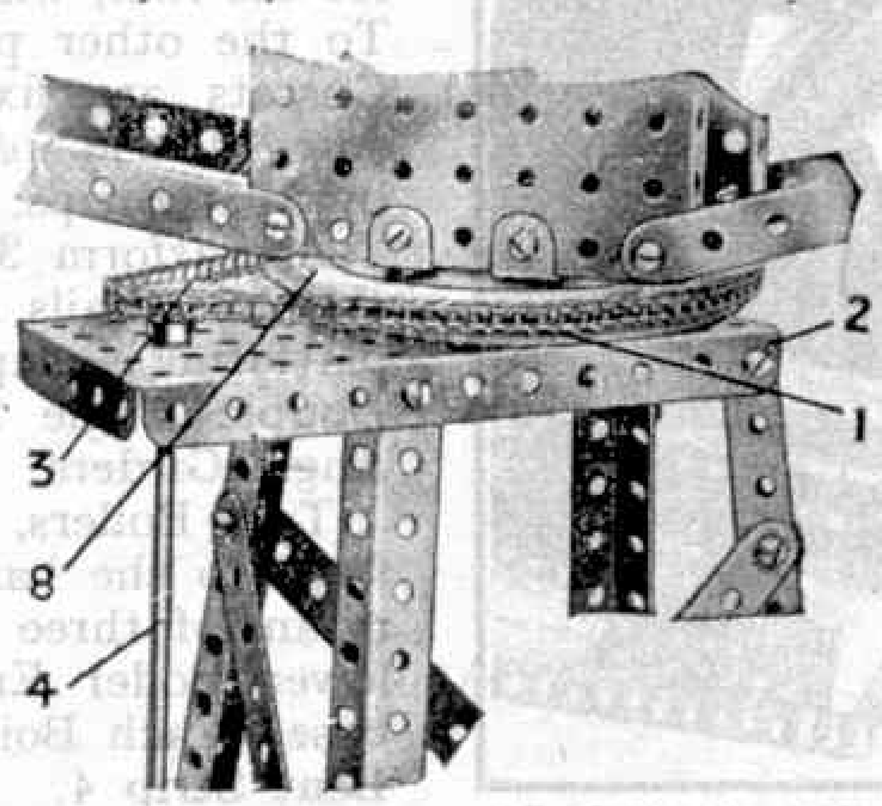


Fig. 4. A method of mounting the Ball Bearing for carrying the jib of a crane.

SPECIAL SUMMER COMPETITION

"MOST USEFUL MECCANO PARTS" VOTING CONTEST

At this time of the year most boys spend a good deal of their time out of doors, and with this in mind we are announcing a special voting contest that does not require any actual model-building yet enables Meccano enthusiasts to keep in touch with their hobby. The only items of equipment required are a pencil and a postcard, so that competitors can prepare their entries just as easily while outdoors or on holiday as at home.

From the list of 10 parts named below competitors are asked to decide (A) the part they personally think is the most useful and that can be used in the greatest variety of ways in model-building, and (B) to arrange the parts in the order in which they think the parts will be placed when the "A" votes of all competitors are totalled.

The following is the list of parts included in the contest: 1. Part No. 10, Fishplate; 2. Part No. 108, Corner Gusset; 3. Part No. 165, Swivel Bearing; 4. Part No. 24, Bush Wheel; 5. Part No. 62, Crank; 6. Part No. 133, Corner Bracket; 7. Part No. 147a, Pawl; 8. Part No. 11, Double Bracket; 9. Part No. 59, Collar; 10. Part No. 137, Wheel Flange.

Prizes will be awarded to competitors who forecast most accurately the six parts that receive the highest number of votes and arrange them in order of popularity. In the event of a tie for any of the prizes the neatness of the entry will be taken into account.

As usual there will be separate sections for Home and Overseas competitors, and the following prizes will be awarded in each section. First, Cheque for £2/2/–; Second, Cheque for £1/1/–; Third, Cheque for 10/6. There will be also ten awards each of 5/–.

Entries should be written on Postcards only.

Entries should be addressed "*Meccano Parts Voting Contest, Meccano Ltd., Binns Road, Liverpool 13.*"

The closing dates are, Home Section, 30th September, Overseas Section, 31st December.

New Meccano Model

Windmill Pump

THE new model illustrated in Fig. 1 is a double action windmill pump of the kind used in remote districts for pumping water supplies. A windvane operates two pumping units situated at the base of the tower, and in the model the motive power is provided by a No. 1 Clockwork Motor.

The tower should be constructed first. It consists of four 24½″ Angle Girders bolted to the corners of a square base frame assembled from four 9½″ Angle Girders. The base is partially filled in with 5½″ × 3½″ Flat Plates supported on 9½″ Angle Girders fixed across the base frame.

At the top the 24½″ Angle Girders are joined together by four 3½″ Angle Girders, and each side pair is braced by a 7½″ Angle Girder 1 and by a 7½″ and two 2½″ Strips.

Two of the 3½″ Angle Girders at the top of the tower support two 2″ Strips 2 which are bent slightly to form supports

Fig. 1. A double cylinder windmill pump. It is operated by a Clockwork Motor.

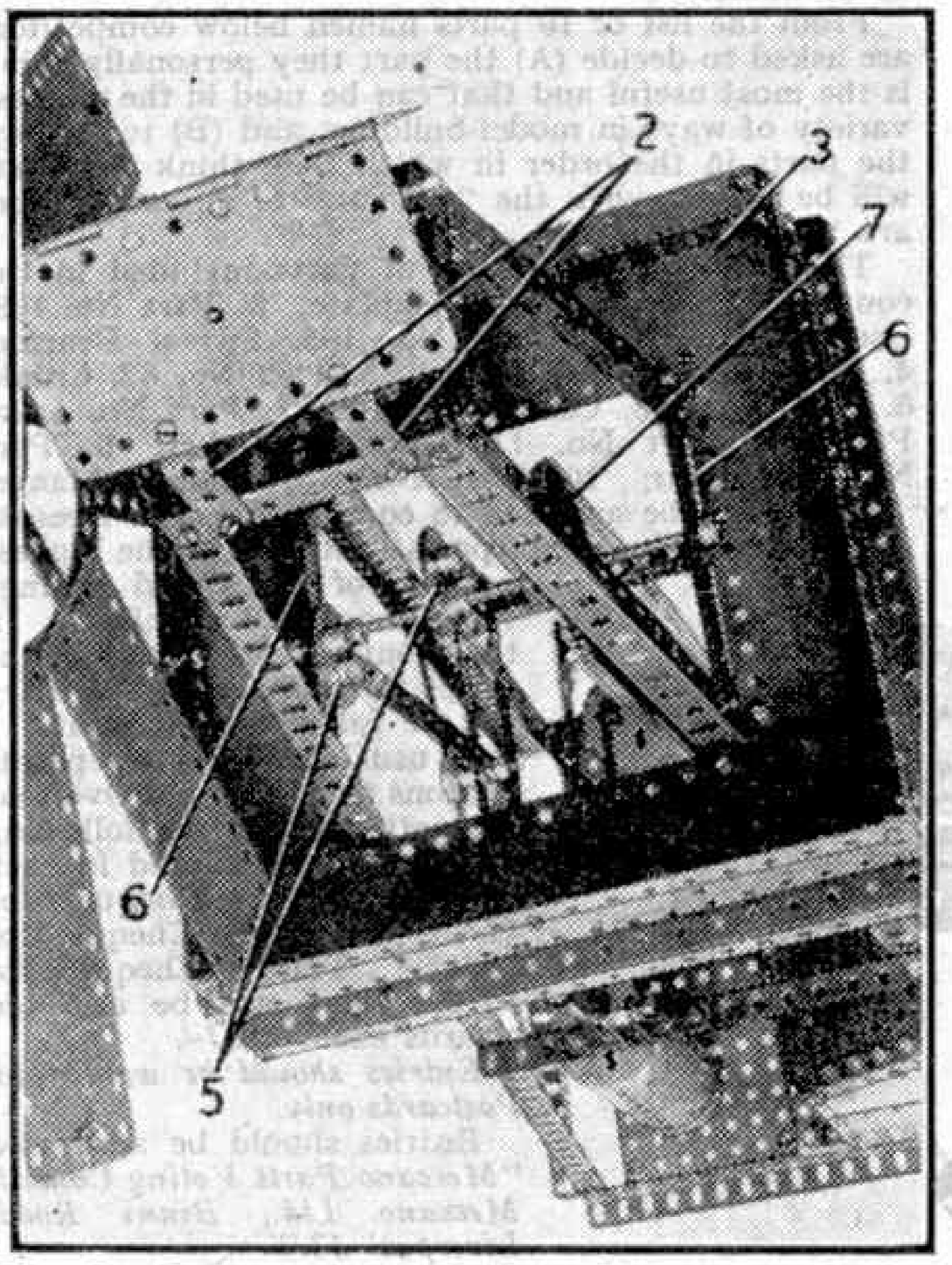


Fig. 2 A view of the platform that surrounds the tower.

for the roof, which is a Hinged Flat Plate. To the other pair of 3½″ Girders Corner Gussets are fixed. The front and rear pair of 24½″ Angle Girders are braced by 12½″ Strips.

A platform 3 is built round the tower and its details are shown in Fig. 2. The platform is supported on eight 2½″ × ½″ Double Angle Strips bolted to the 24½″ Angle Girders.

Two Boilers, complete with Ends, are fixed to the base. They are attached by means of three Bolts passed through the lower Boiler End and the Plates of the base. Each Boiler is fitted with a Double Bent Strip 4.

The No. 1 Clockwork Motor that drives the model is concealed in a housing built

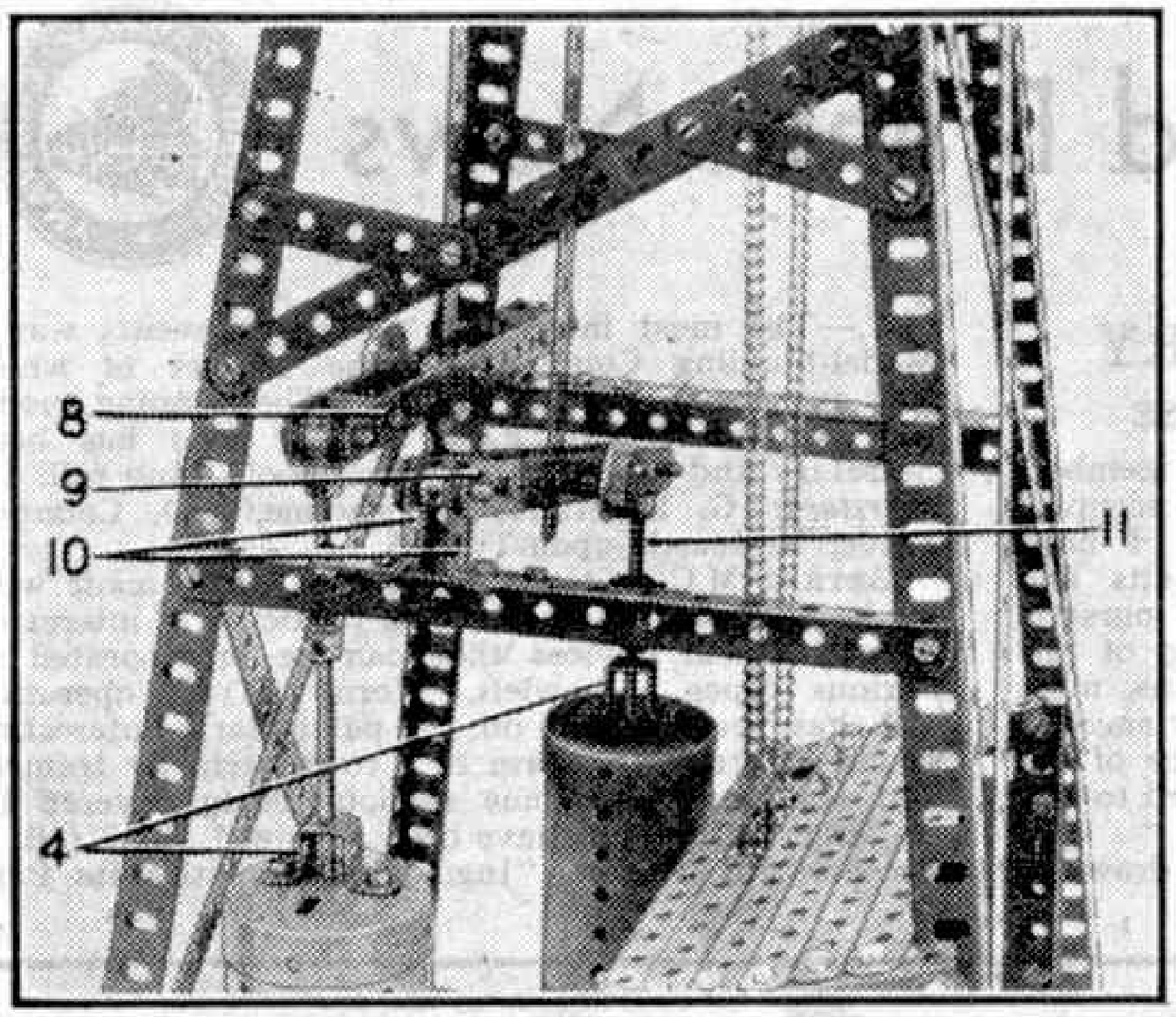


Fig. 3. A close-up showing the details of the pumping gear crossheads.

up from Strips, Angle Girders and Flexible Plates. The constructional details are quite simple and can be followed from the illustrations. The Motor driving spindle should be fitted with a ¾″ Sprocket Wheel *before the Motor is bolted in position.*

The pump operating gear is assembled as follows. Two Eccentrics **5** (Fig. 2) are mounted on a Rod journalled in 5½″ Strips 6 fixed to the back and front Angle Girders of the tower. This Rod carries also a 3″ Sprocket Wheel 7 and a ¾″ Sprocket Wheel, and is held in place by Collars. The ¾″ Sprocket is connected by Chain to a second ¾″ Sprocket on a Rod journalled in the Corner Gussets at the top of the tower. This Rod carries the windvane. The 3″ Sprocket Wheel is connected to the ¾″ Sprocket on the spindle of the Motor.

The arm of each Eccentric carries a 7½″ Strip that forms a connecting rod and links the Eccentrics with the pump crossheads 8 and 9 (Fig. 3). Each crosshead consists of a pair of 7½″ Strips spaced by two Double Brackets, and at one end is pivoted on a 1″ Rod mounted in a pair of 1″×1″ Angle Brackets 10 fixed to one of the 7½″ Angle Girders at the sides of the tower. Washers and a Collar are placed on the Rod to position the crosshead correctly. The other end of the crosshead is pivotally attached to the pump rod by a large Fork Piece, which carries in its boss a 1½″ Rod 11. This Rod in turn is held at its lower end in the spider of a Swivel Bearing fixed on the end of the pump rod.

The 7½″ Strips attached to the Eccentrics are connected to the centre holes in each crosshead by a 1″ Rod, which passes through the crosshead and through the second hole from the lower end of each 7½″ Strip. The Rod is fitted with a ¾″ Flanged Wheel to give a decorative effect.

To build the windvane start by bolting a Bush Wheel to the centre of a 4″ Circular Plate. Now bolt to the Plate, in the positions indicated, eight 7½″ Strips. A Circular Strip is attached to the eight 7½″ Strips, each of the bolts holding the Circular Strip holding also a 5½″ Flexible Plate. The outer ends of the Flexible Plates are bolted to the ends of the 7½″ Strips. The windvane is fixed to its spindle by tightening the Bolt in the Bush Wheel. The lower ends of the windvane blades pass between the platform and the tower, and care must be taken that the blades do not foul the main structure.

Parts required to build the model Windmill Pump: 4 of No. 1; 8 of No. 1A; 23 of No. 1B; 6 of No. 12; 1 of No. 3; 4 of No. 5; 4 of No. 6; 2 of No. 6A; 4 of No. 7; 10 of No. 8A; 4 of No. 8B; 2 of No. 9; 2 of No. 9A; 10 of No. 9B; 2 of No. 9F; 4 of No. 11; 1 of No. 12; 4 of No. 12A; 2 of No. 12; 2 of No. 15A; 2 of No. 18A; 6 of No. 18B; 2 of No. 20B; 1 of No. 24; 280 of No. 37; 24 of No. 38; 2 of No. 45; 8 of No. 48A; 4 of No. 52A; 12 of No. 59; 2 of No. 70; 1 of No. 94; 1 of No. 95A; 4 of No. 108; 2 of No. 116; 8 of No. 124; 2 of No. 130; 1 of No. 145; 1 of No. 146A; 2 of No. 162; 2 of No. 165; 8 of No. 189; 4 of No. 180A; 2 of No. 191; 9 of No. 192; 4 of No. 196; 1 of No. 198.

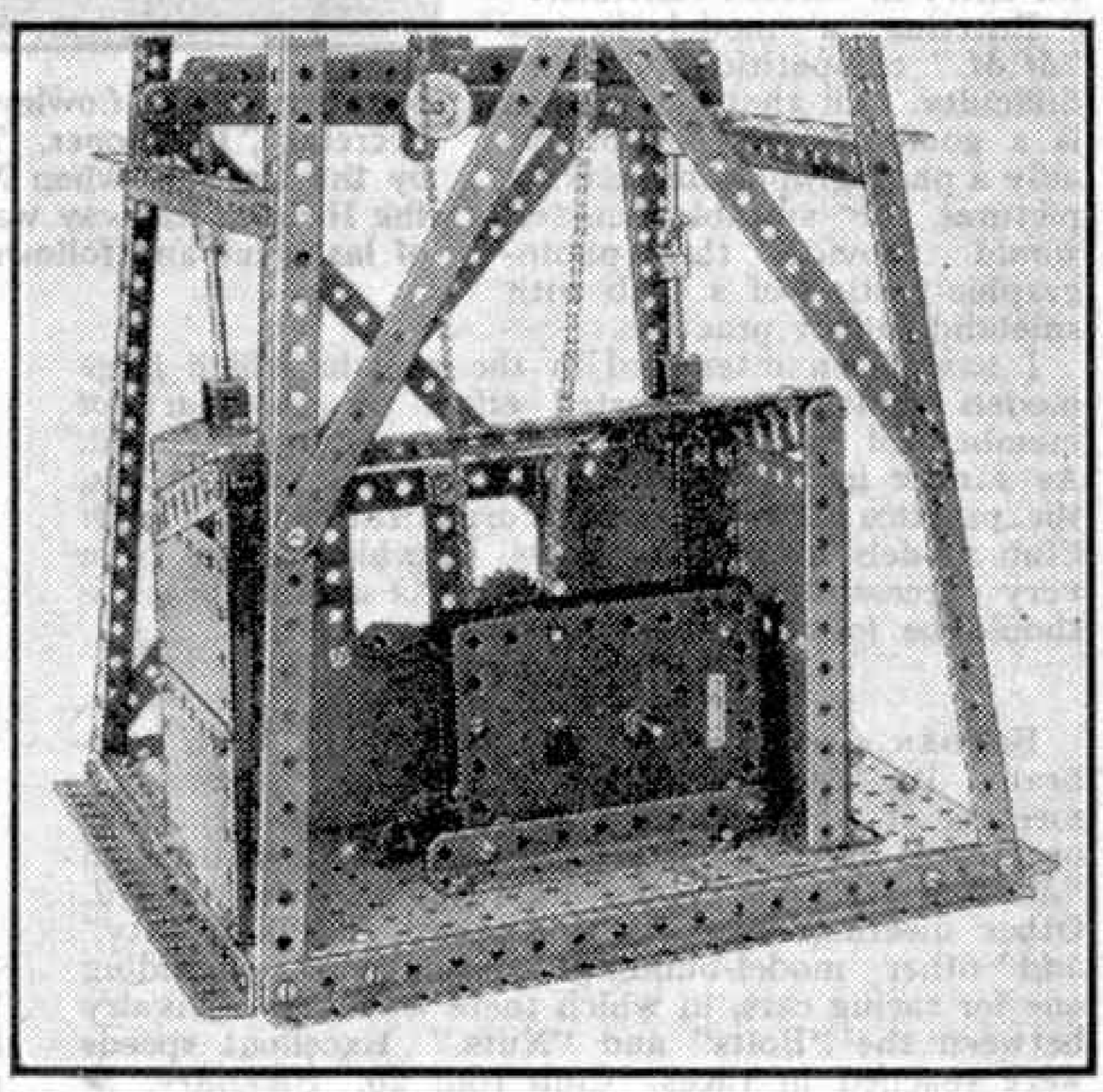


Fig. 4. The base of the windmill pump tower showing the housing for the No. 1 Clockwork Motor.

Club and Branch News

WITH THE SECRETARY

MODEL-BUILDING WITH A PURPOSE

This is the month above all others when members meet out of doors, and the Club Room is occupied chiefly when the weather is unfavourable. I hope that every Club will enjoy outdoor pursuits and excursions this present month, but these pursuits should not prevent officials from thinking of the coming autumn and winter months. Plans must be ready in good time if they are to be really successful, and some idea should be formed at once of the programme to be followed, especially in regard to any new features that may be contemplated.

There is one point to which I should like to draw the attention of Leaders in connection with this. It concerns model-building, always the core of Club activities. It is splendid to see members building good models, large and small, especially in Club competitions, but I am sure the interest would be greatly increased if model-building were carried on with some special purpose beyond this. In many Clubs this is provided for to some extent by arranging Exhibitions, a splendid practice. There are other ways of making the best of excellent productions, however. One is to enter them in the Model-building Competitions announced in the "*M.M.*" These vary considerably in scope, and in practically every Club there must be models under construction at any time that would be suitable for entry in current contests.

Entering a model in an "*M.M.*" competition offers no difficulty. All that is required is a good drawing, or preferably a photograph, and making pictures of suitable models would provide the photographic section of a Club with splendid indoor practice.

I have been interested in the way in which large models built by concerted effort on the part of members of the Kimount M.C., Vancouver, are used. As a note in the Club Reports on this page shows, the practice of this Canadian organization is to enter Club models in Hobby Shows, in which it has been very successful. Wherever possible a similar practice should be followed.

Members of the Cowley (Oxford) Branch, No. 511, Chairman, Mr. F. Cooper, Secretary, D. Cooper. This photograph was taken at an Exhibition arranged by the Branch, when Meccano models built by members were on view and the Hornby Railway was in operation. The Branch was incorporated in June of last year and follows a varied programme, of which Track Nights are the central feature.

CLUB NOTES

BORDEN GRAMMAR SCHOOL M.C.—The Club celebrated its 20th Birthday by a party, following a meeting at which Talks were given by the Secretary on "*Ideas for New Models*," and the Treasurer on "*Making Meccano Clocks.*" Cricket also was played. Other meetings have been devoted to "Simplicity" and other model-building competitions, including one for racing cars, in which there was intense rivalry between the "Bolts" and "Nuts." Excellent speeds were reached in races. Club roll: 20. *Secretary:* S. Wood, 20, Harold Street, Queenborough, Kent.

ROYAL GRAMMAR SCHOOL (NEWCASTLE-UPON-TYNE) M.C.—The most interesting of recent events was a Model-building Competition, the subject of which was any type of wheel vehicle. The winning model was constructed by F. J. Curtis, who has been Secretary and has now left the school. Club roll: 11. *Secretary:* G. S. Miller, "Fairholme," 10, Countess Drive, Newcastle-upon-Tyne 5.

BETHEL M.C.—Steady progress is being made with model-building, members being particularly interested in mechanical devices that can be incorporated in various types of models. Hornby Train operation also has been carried on. A particularly interesting Excursion took the form of a round trip by tramcar and steam railcar, some sections being covered by walking. Other trips have been arranged. Club roll: 7. *Secretary:* B. Davies, "Ingoldsby," Crosthwaite Park South, Dunlaoghaire, Co. Dublin.

CANADA

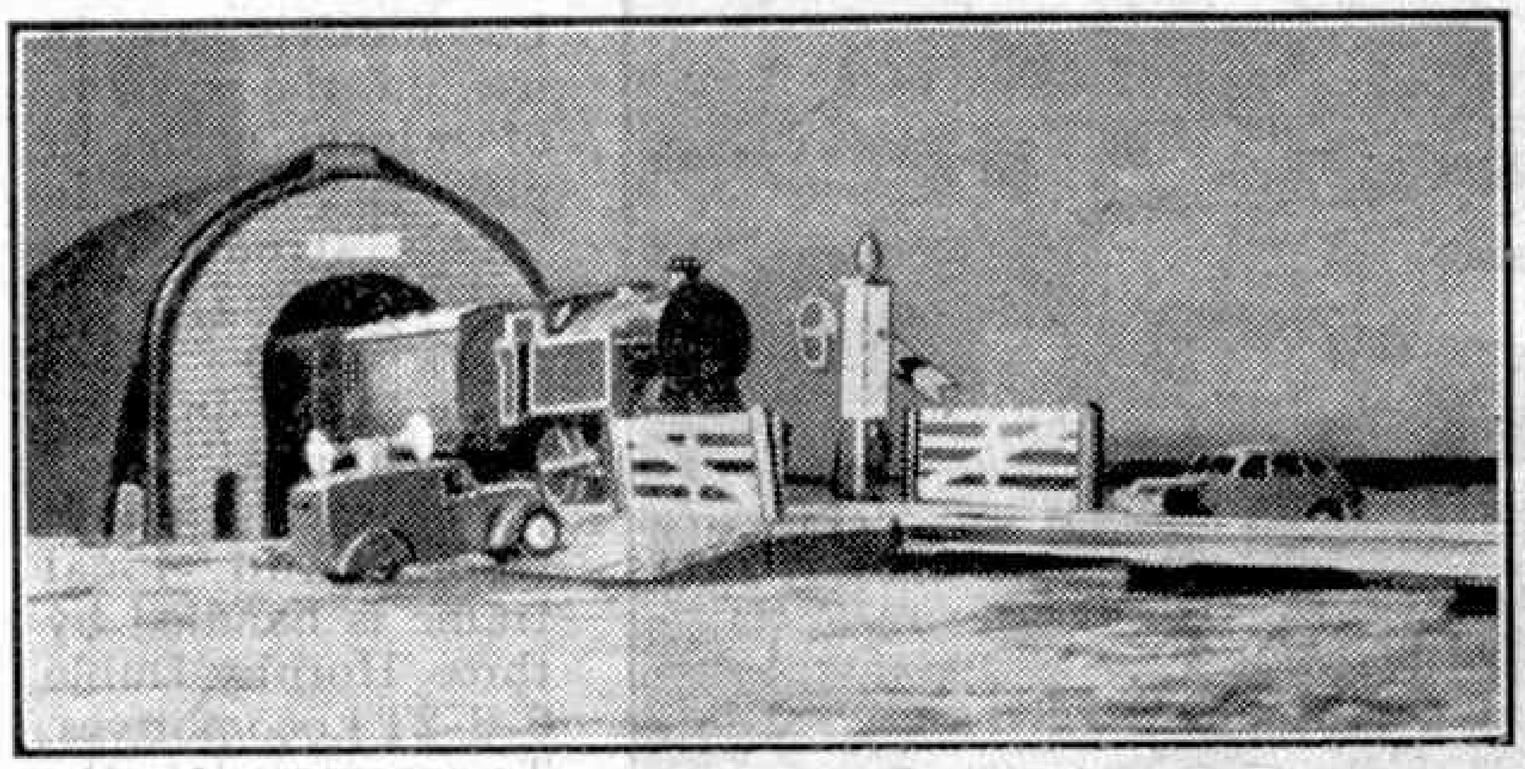
KIMOUNT (VANCOUVER) M.C.—Models have been built and displayed in the Hobby Show of the Vancouver Boys' Club Association, when six prizes were won. Members were kept busy demonstrating the models and answering questions on model-building from visitors. A Meccano Parts store has been constructed; members intending to build models make up lists of parts required, which are then issued to them. *Leader:* B. I. Kersbaw, 405, West Fourteenth, Vancouver, B.C.

BRANCH NEWS

NEW ROAD MODEL RAILWAY (BUCKHURST HILL).—Members worked steadily to complete the Branch layout in readiness for the Exhibition. Standard lamps have been fitted to light up the circuit and red stop lights also have been introduced. Additional rolling stock has been placed in service. *Chairman:* Mr. G. C. Flowers, 21, Boxted Close, Buckhurst Hill, Essex.

An "East Anglian" Hornby Railway

THE Hornby railway system shown in the illustrations is jointly owned and operated. Three keen *"M.M."* readers and Hornby railway enthusiasts, J. E. Tyers, B. R. Owen and P. Smith keep traffic moving on this layout, to which each has contributed rails, rolling stock and accessories. Although it is not an elaborate system, it is an extensive one on which realistic traffic operations are carried out.



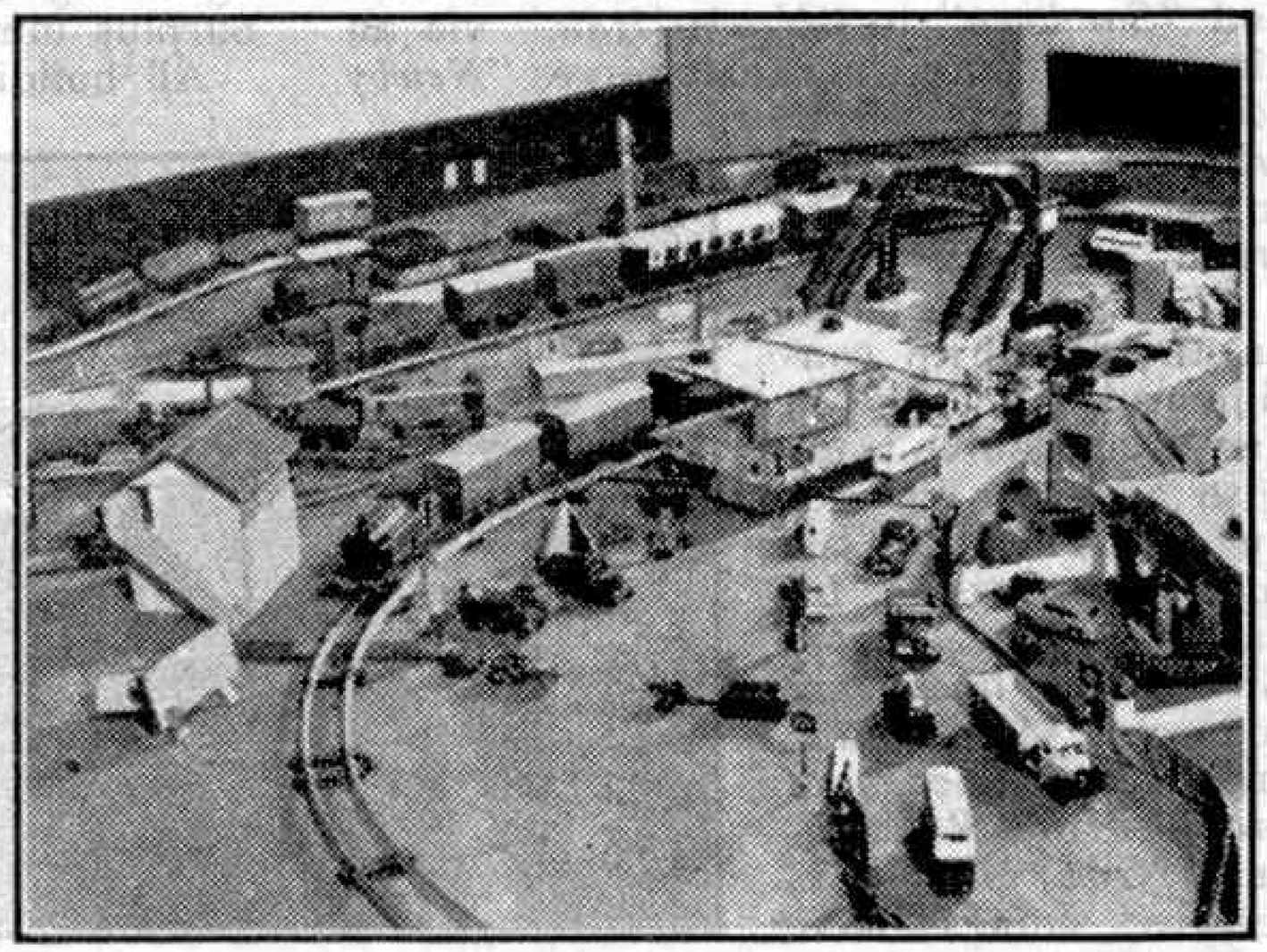
A typical scene at "Lyndhurst Crossing" on the layout described on this page. Photographs were taken by "M.M." reader W. Turnill.

The railway represents an imaginary section of the L.N.E.R., now Eastern Region, in East Anglia. The main line is roughly oval in form and it has an inner loop. The station where the main and inner routes diverge is named *"Everingham Bridge Junction."* This has two platforms, one for each route, and both platforms are linked with the roadway system that forms an important part of the lineside effects. This roadway, as befits the rural character of the district, crosses the different tracks in three separate places by means of level crossings. The roadway also serves a goods platform situated on a branch from the outer main line near another station, which has the realistic name of *"Market Bleaching."* This is a combined terminus and through station.

A more industrial area, too, is served by another line that follows the general oval contour of the main track. It leaves this at another station named *"Lyndhurst,"* runs with it for some distance, and ends up at a factory building that has a covered goods bay of its own.

"Everingham Bridge" is quite an important centre and a model town has been developed there. The main street is electrically lit and there are shops and a garage, the last very necessary in view of the fleet of motor vehicles that operate on the roadways generally.

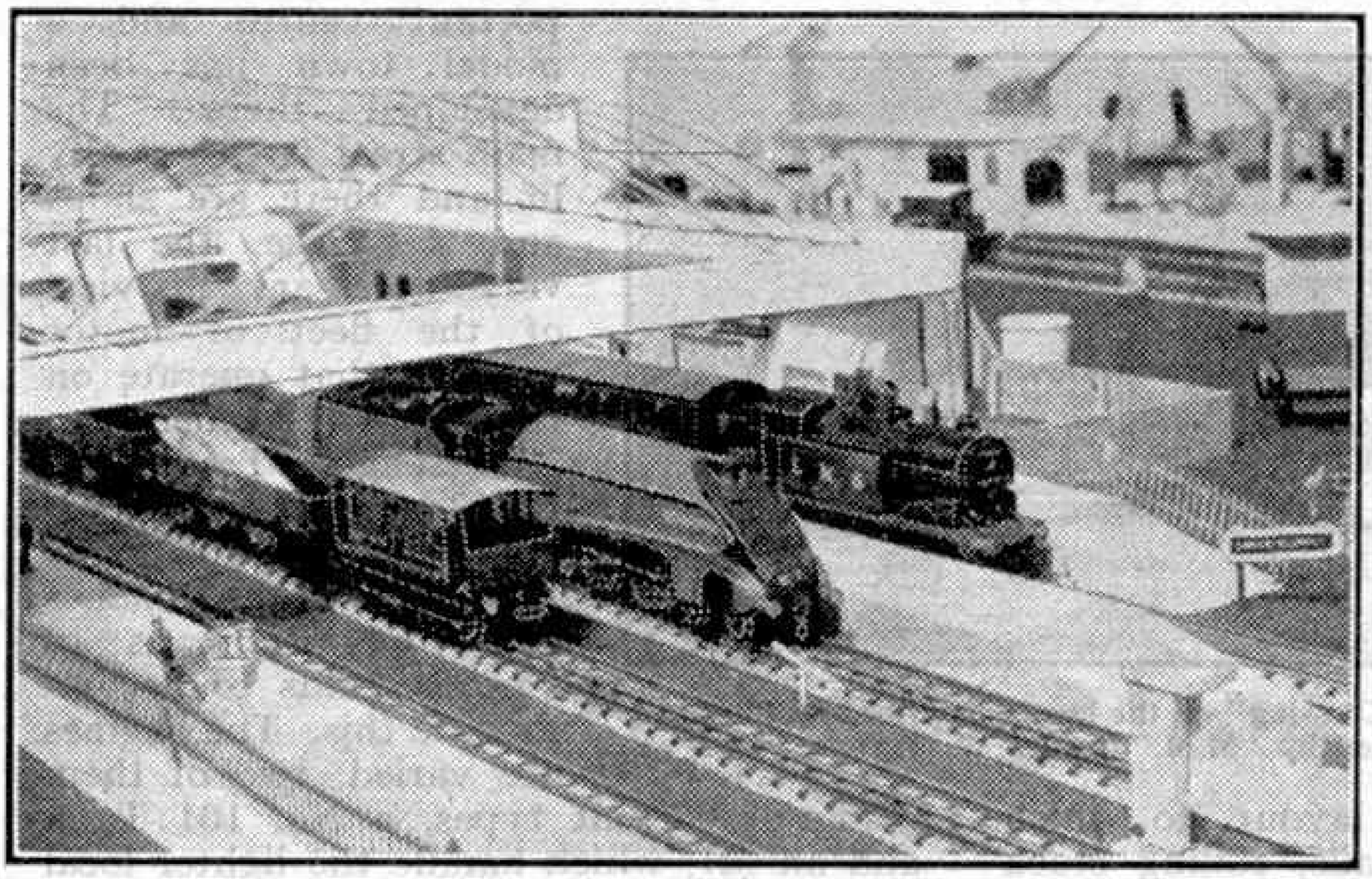
Passenger Traffic on the layout is considerable and there are three Hornby No. 1 Coaches and four Pullmans of various kinds to accommodate this. The engines are varied, two of them being of current types, a No. 101 Tank and an M1, which handle the lighter local traffic. Pre-war designs also are represented, as there is a No. 1 Special for heavy freight and a large 4–4–2 tender type engine. The coal and raw materials are conveyed to the factory district in trains of open wagons. Typical country district traffic is provided for by Milk and bogie Luggage Vans. In case of emergencies, a Breakdown Crane unit is stationed at *"Market Bleaching."*



A general view of "Everingham Bridge" showing the junction station and its busy surroundings, both rail and road.

The Hornby-Dublo "Rutland Railway"

THE *"Rutland Railway"* is a Hornby-Dublo layout owned by Mr. J. M. Davenport, of Walton, near Warrington. The system represents a railway supposedly in Eastern England, owned jointly by the former L.N.E.R. and L.M.S. According to the description supplied by the owner, the line runs from *"East Point Harbour"* where ships sail to the Continent, to *"Rutland,"* which is the headquarters of the system; thence to *"Sandown."* A local passenger service runs between *"Rutland"* and *"Sandown"* to *"Newby Halt,"* via an alternative route. This halt serves *"Newby Main Colliery"* from which coal trains form an important traffic.



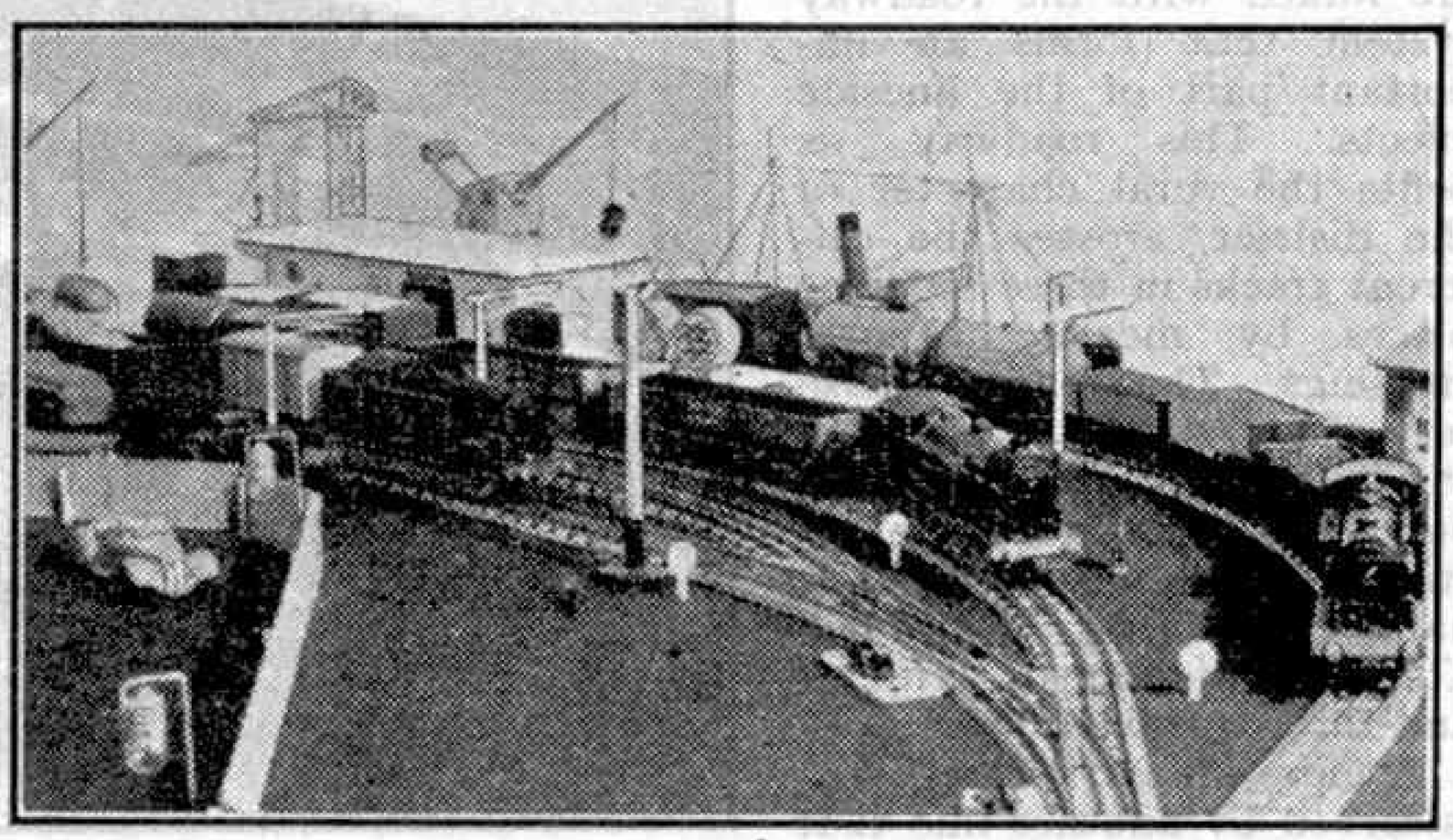
Passenger and goods trains at the main station on the "Rutland Railway" layout of Mr. J. M. Davenport. Photograph by Mr. R. G. Garner.

The layout is based on the favourite continuous track, the main line being double track with an outer line for suburban traffic running alongside for most of its length. All three lines are connected by points, and loop lines are provided at *"Rutland"* and *"Newby Halt."* Extensive sidings have been built at the harbour docks, with adequate warehouse accommodation, and there are light and heavy cranes on the quays. The Locomotive Department at *"Rutland"* has an engine shed, turntable and water towers.

Six Hornby-Dublo Locomotives are in use on the system, of which pride of place is taken by an "A4" streamlined 4–6–2 No. 7, *"Sir Nigel Gresley."* Next come two pre-war "Pacifics" for passenger work. Goods and local traffic is handled by three Hornby-Dublo 0–6–2T Locomotives. To accommodate the traffic there are eight passenger coaches, and over 25 goods vehicles of all types.

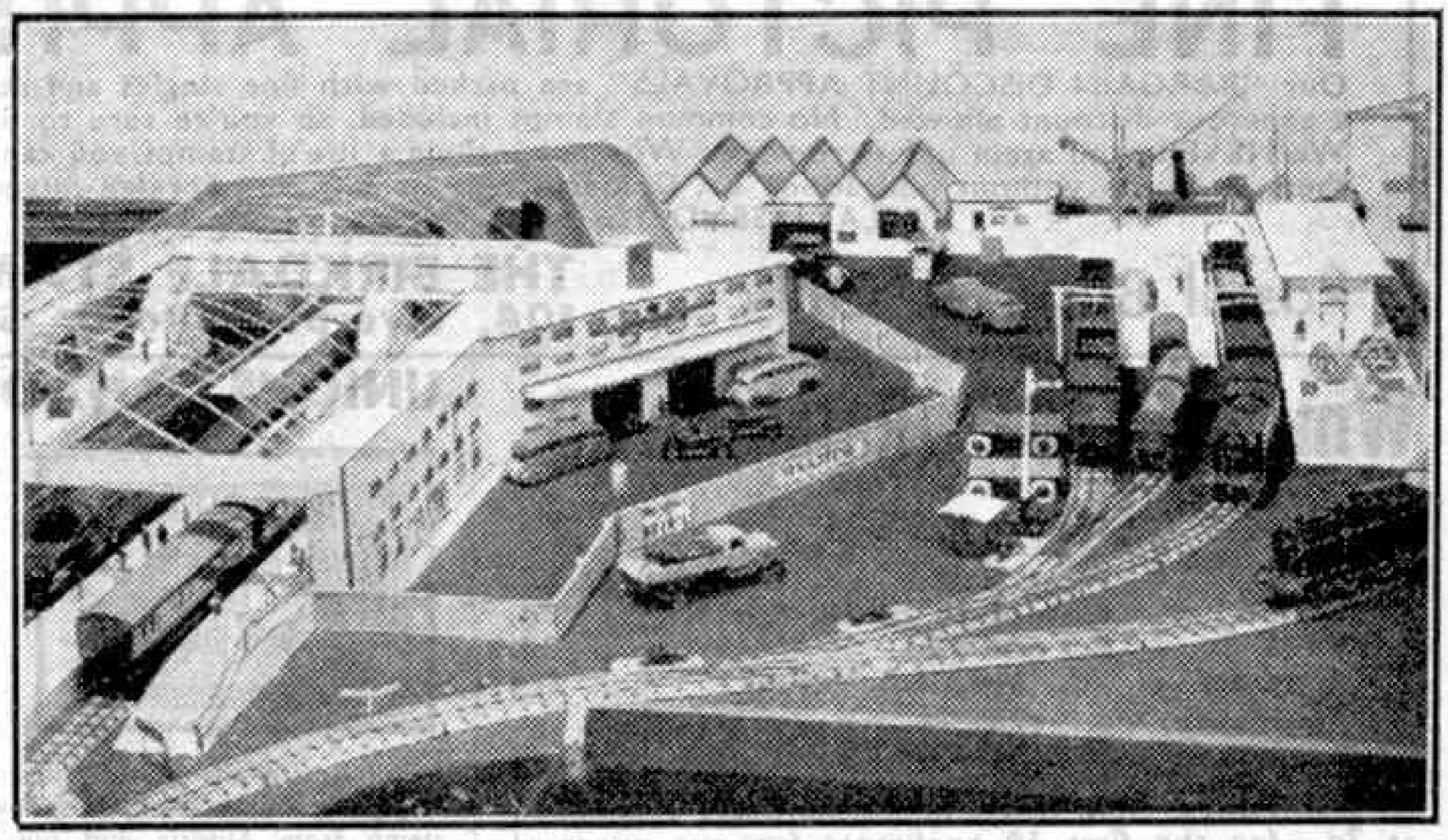
Control over the 20 separate sections into which the layout is divided is centralized at a switchboard near *"Rutland"* station. Four Hornby-Dublo Controllers look after the main sections. On the main line Dublo electric signals have been interlocked with the points. *"Rutland," "Sandown"* and *"Newby Halt"* are controlled by colour-light signals made from Government Surplus miniature bulbs.

All buildings are of home construction,



A goods yard and dockside view on the railway. Freight traffic of various kinds is evidently plentiful.

the archspan roofs of the main stations being made up of thin strip steel. Roads enclosed by strip steel fencing link up the stations, and there are bridges and level crossings. Effective use is made of miniature figures and Dinky Toys. Buildings and roads are illuminated, a separate circuit from a Meccano Transformer providing the current. Those coaches that have glazed windows are also provided with illumination.



A general view showing the main station, the road approach and goods yard. Dinky Toys motor vehicles are effective at the lineside.

The whole layout is built up on shelving around a spare room measuring 10 ft. by 10 ft. and the boards are covered with green felt. This not only adds to the scenic effect but also serves to reduce noise. There is ample room for further development, but this must of course depend on the availability of material.

A Gauge 0 Irish Postal Van

READERS will remember the remarkable gauge 0 miniature railway system of Mr. C. L. Fry, of Dublin, that was described in the January 1947 "*M.M.*" In addition to thoroughly up-to-date stock, the railway boasts numerous locomotives and complete trains of a "period" character and so presents in attractive model form the progress in rail transport over the past century or so.

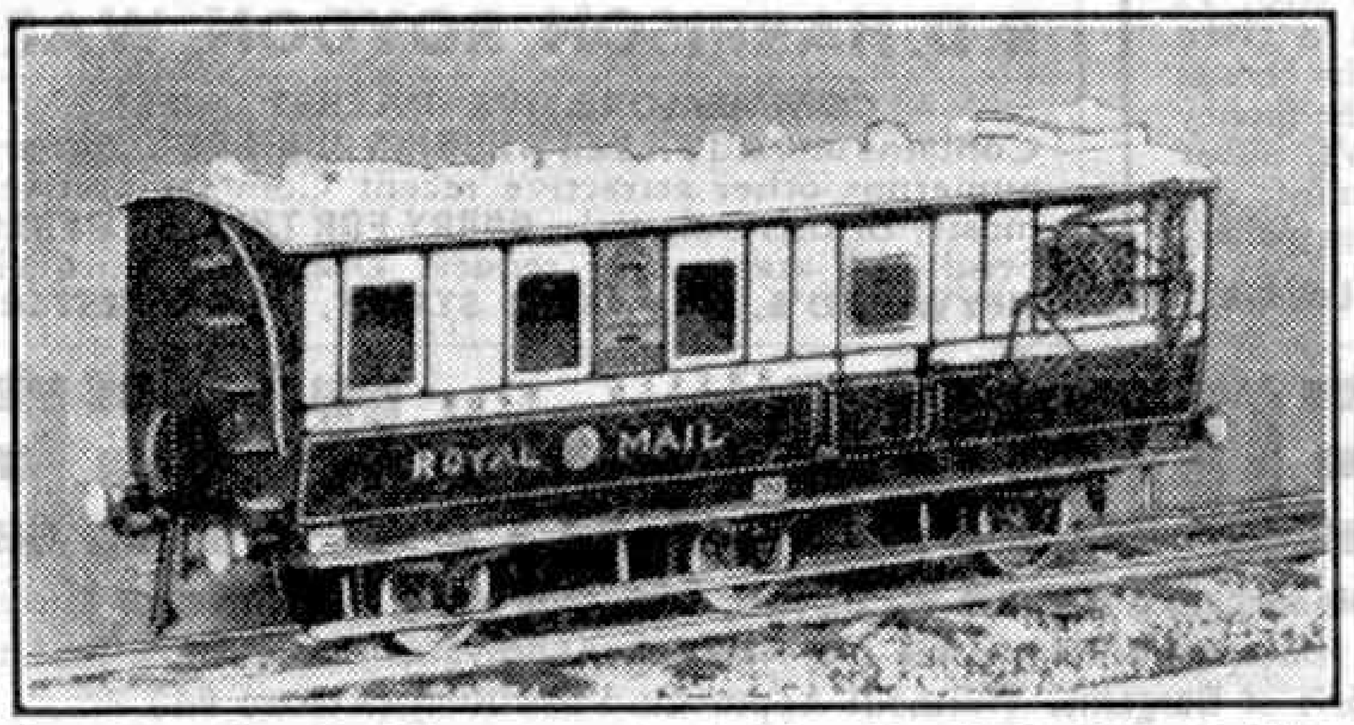
A typical historic rolling stock model is shown here. This represents a Travelling Post Office mail van put into service in 1887 by the former Midland Great Western Railway of Ireland.

The model, like the real van, has the characteristic proportions of 6-wheeled stock that was running on most British railways at one time. Like many real vehicles of this kind it has special axle-box arrangements to allow it to run round curves of 2 ft. 6 in. radius.

The mail net on the side of the van extends so that the actual exchange of postal pouches can be carried out when passing the miniature lineside apparatus.

The net is operated from a track ramp alongside the centre rail. As was usual in older postal vehicles the roof has two typical skylights in addition to the usual ventilators and lamp tops and it also carries a dummy water tank.

The model is finished in the handsome blue and white livery once used by the Midland Great Western Railway. To agree with this finish the Royal initials "*E.R.*" lend an attractive "period" touch to the posting box on the side of the vehicle.



An attractive Postal van constructed by Mr. C. L. Fry, Dublin. The net extends for the exchange of mail pouches.

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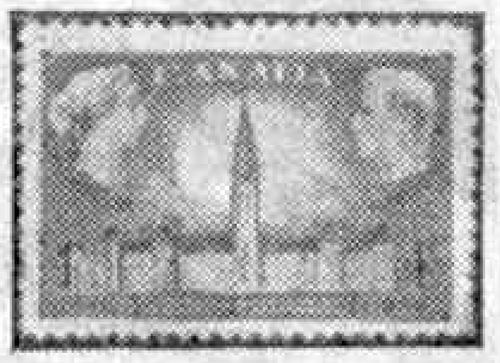

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For other Stamp Advertisements see also pages 322 and xi.

Stamp Collecting

A Holiday in Switzerland

By F. Riley, B.Sc.

WE cannot all spend a holiday in Switzerland, that wonderland of mountains, glaciers and lakes, but every stamp collector can transport himself in spirit to that country by gathering its stamps and browsing over them. Many of these picture the giant mountains and lakes, illustrate the simple life of Swiss country folk, draw upon stirring episodes in the country's history, and show also some of the splendid railways for which the Swiss have become famous.

Let us begin with Geneva, an ancient and world-famous city. This stands on both sides of the Rhone where this river flows out of Lake Geneva, and it has had a wonderful history. It became a city of refuge for Protestants in the days of the Reformation, and it will always be associated with John Calvin, who gave his name to a religious creed. After the first world war it became the home of the League of Nations.

The central stamp on this page is a reminder of a famous episode in the story of Geneva. It shows the castle of Chillon, at the head of Lake Geneva, where Byron's famous prisoner was immured for six years. The name of the prisoner was Bonnivard. According to Byron's poem he was a Protestant who suffered imprisonment on account of his religion. The story is tragic enough, but appears to be largely imaginary. The real Bonnivard seems to have been a political prisoner who only became a Protestant after his release.

Another outstanding event in the story of the city was a convention held there in 1864 to establish rules for dealing with the sick and wounded in war. The originator of the scheme then arranged was a young Swiss, Jean Henri Dunant, and the outcome of his efforts was the famous Red Cross organization, which derives its name from its distinctive flag. This shows a red cross on a white background, and is indeed that of Switzerland itself with the colours reversed.

Two stamps issued in 1939 marked the 75th anniversary of the Geneva Convention. They were of the same design, one in red and buff and the other in bright blue and grey, and one of them is reproduced at the head of this page. The design appropriately shows Geneva itself from the lake, and in one corner is a shield showing the Red Cross of the organization set up in 1864. A portrait of Jean Henri Dunant is to be seen on one of a special children's fund series in 1928. This is a reminder of the now famous charity stamps issued in Switzerland every year at Christmas, which are known as the Pro Juventute series. This began in 1913 and many striking and beautiful designs have appeared in it. Two of these are reproduced on this page. The upper one, which was issued in 1929, shows sunset over Lake Lugano, with Mt. San Salvatore in the distance; the reproduction gives no idea of the brilliant colouring of the sky and its reflection in the water. The lower one shows a more rugged but equally characteristic scene, for it illustrates the Wetterhorn, a peak in the Bernese Oberland. This has three summits, the highest of which is 12,166 ft.

The Pro Juventute stamps have included a fine range of pictorials of a similar type to the two illustrated, together with a host of portraits of famous Swiss and a collection of designs showing the arms of the cantons of Switzerland. In themselves the stamps provide a splendid subject for a side-line collection, and every one of them shows some aspect of Switzerland that would interest us greatly in a holiday there. For instance, the arms of the cantons of Uri and Schwyz would remind us of the romantic origin of Switzerland, for the men of these cantons, with those of Unterwalden, now divided into Obwald and Nidwald, were the first to bind themselves together to resist the tyranny of the Hapsburg rulers of the country. It was in Uri that the famous William Tell lived. Whether the story of how he shot an apple from the head of his son with a bolt from his crossbow is true or is just a legend, it is one that arouses the greatest possible interest and deepens our admiration for the sturdy men of the cantons who founded the independence of their country. Tell's Chapel on Lake Lucerne is shown on a stamp issued in 1938, and a portrait of Tell himself is seen on a stamp of 1914 issued in various values and colours.

These are only a few of the wonderful stamps that illustrate the people, mountains and lakes of Switzerland. There is no space here to deal with them in detail, but I must add a reference to the last of the stamps illustrated, which shows one of the country's electric railways. The Swiss are great engineers as well as watch and clock makers, and they have taken full advantage of the many falls in the country to develop hydro-electric power on a large scale, and to use this for transport purposes. This last stamp therefore illustrates yet another side of Swiss life that would certainly be attractive to "*M.M.*" readers who could visit the country.

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25 Bulgaria	12 Fr. Guinea	25 Japan
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25 Canada	12 Fr. Soudan	10 Lebanon
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For other Stamp Advertisements see also pages 320 and xi.

Stamp Gossip
and Notes on New Issues

By F. E. Metcalfe

EVEN though we are in the middle of summer new stamps continue to pour out. In the old days collectors could put away their stamp albums when they took out their cricket bats and bathing suits, knowing that when they came to reverse the action in autumn they would soon be able to catch up, and the few stamps they had missed would be easily obtainable.

Alas, the same conditions do not obtain to-day, for stamps are in and out in a flash, and sets which cost coppers when they appear soon need as many shillings if they are to be purchased. A case in point is the set of Ascension, which recently appeared perforated 14. Only three low value stamps were concerned, with a total face value of 4½d., and for a week they were on offer at 6d. a set. Then the news got round that the Crown Agents in London had no more stock and up zoomed the price. Anything from 2/6 to 10/– was asked and obtained from the multitude of collectors who had missed the boat.

Several other instances could be given, but probably enough has been said to show that it is unwise to forget one's collection entirely during the months when one would rather be outdoors.

The best way is to join a new issue service, and put the stamps carefully away until the inclination to collect returns, as it surely will, when the cold wet days are back again.

As I have remarked before, stamps depicting ships are by far the most popular, and hosts of collectors will welcome a real peach of a stamp which was recently issued by South Africa, to commemorate the centenary of the first settlers in Natal. There was a good deal of criticism of the design in South Africa on the grounds that the rigging of the ship was all wrong, but an ex-sailing vessel hand was quick to point out, when he saw the stamp, that there was nothing whatever wrong with the rigging. Anyhow, right or wrong, collectors of "ship stamps" have gleefully added the newcomer to their collections, and that's all that matters really.

Australia has provided us with a new and rather handsome stamp, though not everybody will agree that the latest design is superior to the one replaced.

It is understood that this new design will be adopted also for the new 10/–, £1 and £2 values which are to appear sometime in the near future.

We have remarked previously how badly centred Australian stamps generally are, and this recent addition is no exception. Dealers who have to handle them are very annoyed, and have awarded to Australia the distinction, hitherto not very proudly held by Spain, of being the country issuing the worst centred stamps. Speaking of Spain, this country is now producing a number of quite attractive stamps, and as most are readily obtainable used quite cheaply, no doubt some of their old-time popularity will return. A quite extensive collection of used Spanish stamps can be gathered at low cost, and while their investment possibility is not great, there is no need to spend much on modern Spain, at any rate.

Another country which went out of fashion during the last war, but which is now returning to favour, is Japan. The quality of Japanese stamps, as far as the paper used is concerned, is shoddy in the extreme, but some of the designs are delightful, and apart from the special issues, where one gets the handsome pictorials, even the ordinary postage stamps are well worth collecting for their designs.

We are illustrating one of these. It is not a pretty stamp, or even of nice design, but how significant the design is. Here we see a worker, with some kind of a pick over his shoulder, and all that on a Japanese stamp. Who would ever have thought before the second world war that an ordinary worker would be depicted on a stamp of aristocratic Japan?

The U.P.U. 75th anniversary commemorative stamps, which are being issued by all our colonies as well as Great Britain, are not due until 12th October, but other countries are simply teeming out sets, and very popular some of them are going to be. In fact, many collectors are taking all the issues, and as apparently every country which is a member of the Postal Union has issued or intends to issue a set, they will have a task on their hands to complete their collections. But this will be well worth while, for most of the sets, if not all, will be of low face value and some attractive designs can be expected. At the time these notes are being written nothing is known regarding the design selected for our own colonies, but it should not be difficult to produce something more attractive than the "Victory" stamps, and if our country does not beat the "Olympic" stamps designs, well it isn't trying.

We haven't written much lately about the stamps of the country which generally gives us such superb designs—France. Of course new issues are coming out every week. The government owns a most expensive printing plant and it has to be kept busy. The stamp we are illustrating is a fair sample of the handsome stamps it turns out. One excuse is as good as another, and this time homage to the U.S.A.—hence the "Stars and Stripes" on the left shield—is the raison d'etre. Great Britain is to be similarly honoured.

One more country we would like to mention this month is Portugal, which has just issued a really magnificent set. In the next issue of the *"M.M."* we hope to have room to illustrate one of these stamps. They have been printed in Switzerland by the famous Courvoisier firm, and depict portraits of the great men of Portugal during its finest periods of history. Portugal has a proud past, and these stamps worthily honour it.

The Painting of Merchant Ships—

(*Continued from page 294*)

varnish are frequently used for wooden deck structures and look very well when they are thinly and evenly applied; they are seldom used for steel except where deckhouses, etc., are grained as in the Ben Line, where Chinese painters are always carried. The use of aluminium alloy for deckhouses and other fittings in order to save weight, which is rapidly coming into fashion, calls for new paints which are still in the experimental stage.

Special paint is demanded by the funnels owing to the hot gases passing through them. Ordinary paint will flake and fall off, and paint with lead in it will be discoloured by the sulphur. Soot round the tops of the funnels must always be scraped off carefully, and most companies choose a design with a black top to hide it. Raking funnels, like masts, can be very awkward to paint, and in doing them men have often been scalded, sometimes fatally, through steam suddenly blowing off owing to the engineers not having been warned to keep the pressure down. Ventilators are often as distinctive in their colouring, inside and out, as the funnels. The life-boats demand special care, partly for their appearance but largely to keep them watertight even if they have been exposed to a hot sun. Care is also demanded on the davits lest the working parts should be "painted up."

Not all the problems are on the outside of the ship, for there are many internal spaces such as bunkers, double bottom compartments and the like where there is a danger of very rapid corrosion owing to changes of temperature. Bituminous paints, with particular care that there is no chance of corrosion starting under them, are often used for such spaces, as well as water tanks, for their virtue of setting very hard and lasting for years. They are also frequently used for the tanks of bulk oil carriers, particularly those used for spirit which corrodes steel, especially round rivet heads, very rapidly. There are many other troublesome cargoes; sugar, for instance, gives off a gas which discolours the interior paintwork of the holds, and certain cargoes demand that the paint should be perfectly dry and hard before they are shipped. As one instance, if cotton comes into contact with oil or grease there is the possibility of spontaneous combustion and a disastrous fire.

One way and another, it is not surprising that paint enters so much into the calculations of the shipowner and the seaman.

How Electric Trains Are Driven—

(*Continued from page 305*)

accelerating in notches 2 and 4 further acceleration can be suspended by moving the handle back to Notch 1 or Notch 3. However, this will leave some of the resistance in circuit, and motormen must beware of running in that condition for long because of overheating.

The device that effects automatic switching out of the resistances is the accelerating relay, which operates each time the current taken by the motors falls to a chosen level, and completes the circuit to close another contactor.

Often the setting of this relay can be altered by a "rate switch" in the motorman's compartment, so called because, according to whether it is "on" or "off," it allows two rates of acceleration to be selected.

Sometimes, after the accelerating relay has made the change to parallel motor connection and cut out all resistance, it effects one or more stages of further acceleration by weakening the magnetic field in which the motor armatures rotate. This may be done by connecting a resistance across the field windings to divert part of the current they take, or by means of tappings on the windings, or by a combination of both methods. Contrary to what might be expected, a weakened field causes the motors to run faster. Usually the motorman can choose whether or not he will let acceleration continue through these extra stages by operating a switch that cuts them out at will, or by using a particular forward setting of the reverser handle alongside the master controller.

In modern multiple-unit trains it is usual practice for the groups of contactors, relays and resistances to be assembled in cases carried on the underframes of the motor coaches. There is still plenty of rolling stock to be seen, however, in which such apparatus is carried in a compartment behind the motorman. In electric locomotives it occupies the high-tension compartment in the body, and cooling of the resistances is often assisted by passing over them some of the air from the blowers that ventilate the traction motors.

Resistances in electric locomotives are usually rated to carry heavy currents for longer periods without overheating than those in multiple-unit trains, and there may be many more notches in the accelerating sequence. A considerable range of economical running speeds can be provided by combining weak-field operation with different motor connections: for example, the use of full-field and three weak-field steps in series, series-parallel and parallel, giving 12 running speeds in all, as is being provided in some 1–Co + Co–1 locomotives now being built for South Africa jointly by the North British Locomotive Co. Ltd. and The General Electric Co. Ltd. Automatic acceleration is rarely employed in locomotives, and the total number of accelerating steps may amount to as many as 57, as in the French 2–Do–2 locomotives running on the Paris-Bordeaux main line.

There are methods of doing without resistance control, as in the Southern Region electric locomotives and the metadyne trains of London Transport. It is not necessary, either, where alternating current is used, as on the electric railways of Sweden and Switzerland for example. Recent and pending electrifications in Great Britain, however, are all direct-current (only one British line is still worked with a.c.), and so the methods of control described in this article are likely to be seen in our electric trains and locomotives for a long time to come.

A MINIATURE PERMANENT WAY HANDBOOK

Many "*M.M.*" readers will be acquainted with "Peco" range of permanent way material for 00 and HO gauge and similar railways. This is manufactured by the Pritchard Patent Product Co. Ltd., Sidmouth, and provides for the more advanced model railwaymen in these miniature gauges the necessary parts for assembling track at home. There are two closely related main systems known respectively as "*Peco-Way*" and "*Peco Individulay.*" In the former the sleepers and ballast are represented by a ready-embossed and punched card track base with a corresponding card underlay. The "*Peco Individulay*" system involves the use of separate sleepers, positioned according to a printed foundation tape, and actual ballast.

Full details of the use of the two systems, illustrated by clear diagrams and some photographic reproductions, are contained in "*The Peco Platelayer's Manual*" by R. Watkins Pitchford, which forms a complete guide to these track products. It also contains useful observations on the relationship of gauge and scale, and hints on other allied topics.

Although the "Peco" system is primarily intended for use in conjunction with stock equipped according to M.E.T.A. standards, provision is made for the special circumstances arising when either Hornby-Dublo or Trix trains are in use. But stock or track of each of these varying types cannot be mixed together.

Copies cost 4/9 each, from shops where "Peco" products are stocked.

BACK NUMBERS OF THE "M.M."

A few copies of the following issues are available price 8d. each, including postage, etc.—January 1946; January, April, July, August, September, October, November 1947; May 1948; February and July 1949.

Readers wishing to obtain copies of these issues should write immediately to the Editor.

Competitions! Open To All Readers

Prize-winning entries in "M.M." competitions become the property of Meccano Ltd. Unsuccessful entries in photographic, drawing and similar contests will be returned if suitable stamped addressed envelopes or wrappers are enclosed with them.

Make Up A Simple Crossword

Here is an interesting competition for the holiday month. It is a kind of cross-word puzzle, but competitors are asked to make this up for themselves. There are 25 squares in the diagram to be used, with no blanks. Only 25 letters therefore are required and the longest word can have only 5 letters in it, while within limits entrants can choose their letters themselves.

The idea of the competition is to choose from this issue of the "*M.M.*" a sentence or phrase containing 25 letters, and to re-arrange these to form a square like the one shown in the diagram on this page. The aim is to form as many complete words as possible in both the rows and columns of the square. For each word of five letters in one line, horizontal or vertical, 10 points are awarded. The number of points for a word of four letters is 5, and for words of three and two letters the points are 2 and 1 respectively. A line containing two words, one of three letters and the other of two, is allowed 3 points. The greatest number of points that can be scored is 100.

In this contest only English words in current use may be used, and names, slang and coined words are not eligible. Short words forming part of a longer word in the same line do not count in reckoning up the score.

To make the meaning of this quite clear we have taken the phrase "scope of the cheapest cameras," which will be found in the fourth line of the photographic article on page 310, and from the letters of this phrase we have constructed the square reproduced on this page. The points scored in each row and column are shown, together with the total.

	10	5	2	5	10
10	S	C	A	R	E
5	H	A	T	E	P
1	A	F	O	S	O
5	M	E	E	T	C
—	S	E	P	C	H

TOTAL 53

Competitors must indicate the line and page from which the phrase or sentence they use in this contest has been taken.

There are two sections, for Home and Overseas readers respectively, and in each prizes of 21/–, 15/– and 10/6 will be awarded for the best efforts. In the case of a tie for any prize the neatness and originality of the entries will be taken into account.

Entries should be addressed "*August Pointword, Meccano Magazine, Binns Road, Liverpool 13.*" Closing dates: Home Section, 30th September; Overseas Section, 31st December.

Choose Your Sport

August brings us to the peak of the outdoor sports and games season, and for our second competition this month therefore we are arranging a voting contest in which these provide the candidates.

Below we give the names of 10 of these sports and games, and we ask each reader, A, to tell us which is his favourite, and B, to try to forecast the relative popularities of the 10 pursuits as they will be shown by the votes of the competitors.

Each of the 10 sports is numbered, and entrants are asked to use these numbers, so entries can readily be made on a postcard. It is not essential that the sport chosen by any competitor as his favourite shall be placed at the head of the list given below.

Here are the 10 sports and games: 1, Cricket; 2, Cycling; 3, Golf, 4, Motor Car Racing; 5, Motor Cycling; 6, Rounders; 7, Rowing; 8, Swimming; 9, Lawn Tennis; and 10, Walking.

As usual there will be two sections in this competition, one for Home readers and the other for those living Overseas. In each of these there will be prizes of 21/–, 15/– and 10/6 for the entries that most nearly forecast the comparative popularities of the 10 Sports.

Entries must be addressed "*August Sports Contest, Meccano Magazine, Binns Road, Liverpool 13.*" Closing dates: Home Section, 30th September; Overseas Section, 31st December.

August Photographic Contest

For this month's Photographic Contest, the 8th of the 1949 series, there is a very obvious choice of subject. August is the holiday month, and we are therefore inviting readers to submit holiday photographs. As usual, the merits of entries as pictures will be taken into account by the judges, but photographs sent in must show the real holiday spirit.

The competition will be in two sections, A for readers aged 16 and over, and B for those under 16. Each competitor must state in which section his photograph is entered. There will be separate sections for overseas readers, and in each section prizes of 21/–, 15/– and 10/6 will be awarded.

Entries should be addressed "*August Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13.*" Closing dates: Home Section, 31st August; Overseas Section, 30th November.

Fireside Fun

"Only a man with plenty of real gut can tackle this job with success."

"Why, what is it?"

"Stringing tennis rackets."

* * * *

"Hi! Come away from that crumbly cliff edge, or else give me that bag. It's got the sandwiches in it."

* * * *

"Shall I take little Willie to the Zoo to-morrow, daddy?"

"No. If the Zoo wants him let them come and fetch him."

* * * *

"I hear Jones was fired for lying. I didn't think he was as untruthful as that."

"He wasn't. His lying was done in bed, which made him late in the morning."

* * * *

"Well, my 'man, what are you going to do when you are released from prison?"

"Open a shop or two, sir."

"Open a chain of shops? Have you enough money for that?"

"Yes, sir. It will only cost about half-a-crown to get a jemmy."

* * * *

"How long have you been interested in the blind, Mr. Smith?"

"Ever since the old one got torn, mum."

BRAIN TEASERS

TURNOVER NOT EVERYTHING

A fishmonger's assistant sold a lady a herring for 4½d. The owner of the shop rebuked him for not telling the lady that the herrings were sold at 3 for 1/- and persuading her to take three. The assistant then pointed out that the profit on the one herring was the same as if he had sold three at the cheaper rate. What price did the owner pay for the herrings?

* * * *

ODD WORDS

Here is a sentence in which is hidden a message of interest to "*M.M.*" readers. Can you find it?

DUE USE TEA ADD IRISH INK TAKER EYE FACTORS FOR AYE PRESENT AWE VEHICLE ATE THE BUILDINGS DUE BASEBOARD ALL HOT STATION ARE TAN HIT ONE ASS.

M.H.K.I.

* * * *

Country Policeman: "Somebody told me an aeroplane came down here. Do you know anything about it?"

Small boy (with catapult): "No, sir. I've only been shooting at sparrows."

* * * *

A MAGIC SQUARE

Now for an easy word square of 16 letters. The clues horizontally are 1, Character of a sound; 2, On top of; 3, Not far; and 4, Makes a mistake. When the right words have been found the four vertical columns will have in them the same words as the four rows.

B.I.N.

* * * *

POETIC PUZZLE

In the following verse the missing words contain the same four letters. What are they?

When the . . . . all seek the shore,
The . . . . have trouble then in store,
O may no evil . . . . prevail
To foil their . . . . where'er they sail.

S.W.C.

* * * *

SOLUTIONS TO LAST MONTH'S PUZZLES

The well-known proverb of our first puzzle last month was TOO MANY COOKS SPOIL THE BROTH. It can easily be traced out in the square, beginning with the letter T in the centre.

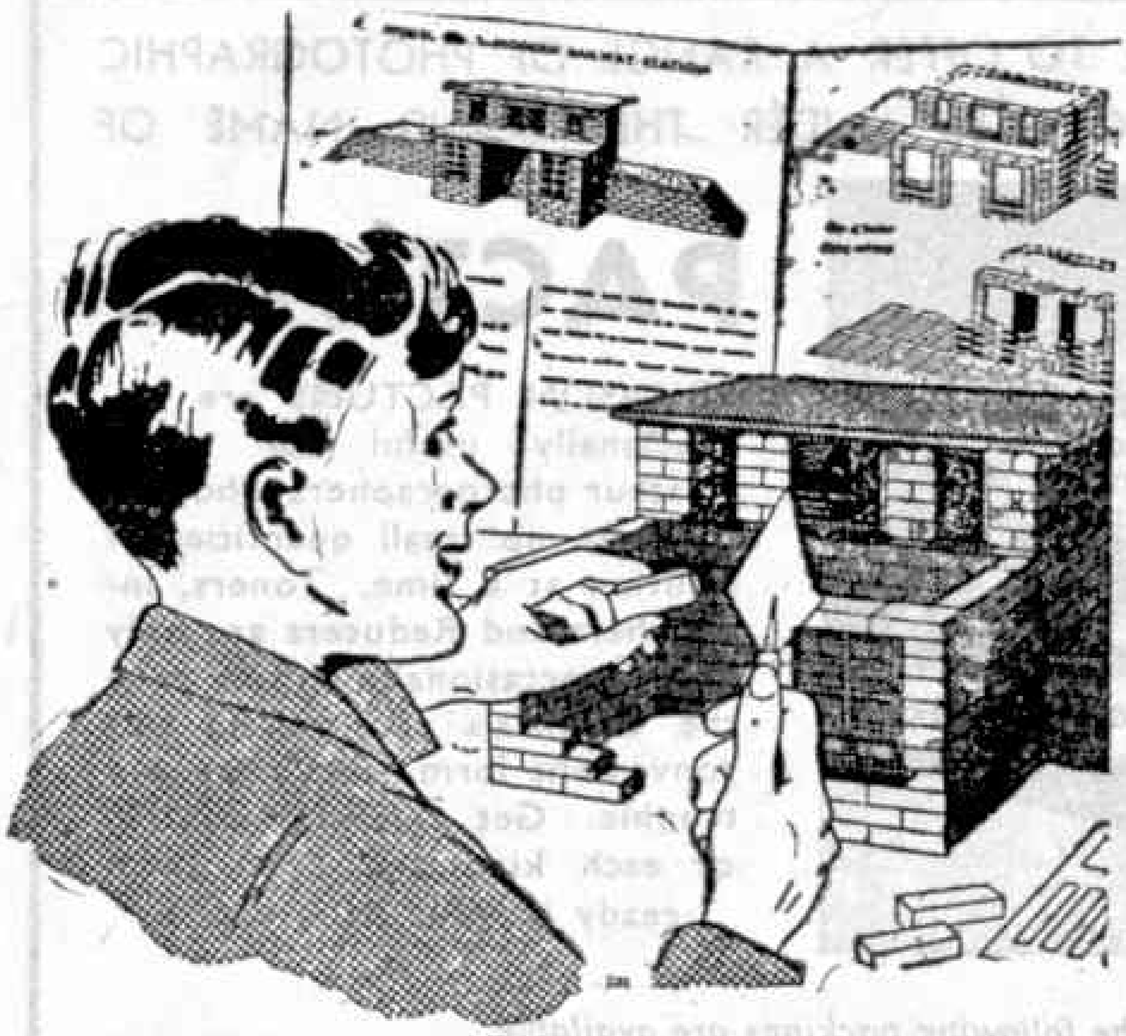
The greengrocer of our second puzzle used weights of 1 lb., 3 lb., 9 lb., and 27 lb.

The circular iron band of our third puzzle had a diameter 24 in. too great, so that its circumference was too great by a distance of 24 multiplied by 22/7 in., that is 75 3/7 in., and this is the length that would have to be cut out of it.

* * * *

THIS MONTH'S HOWLER

Great Britain is in the temporary zone of climate.



JOHN IS BUILDING HIS MODEL VILLAGE WHY NOT YOU?

If you are the lucky owner of a BRICKPLAYER KIT you will have spent many enjoyable hours building the models. As you know, you can dismantle them if you wish, and use the bricks for other buildings. But why not leave them standing and keep on building until you have a complete little village of your own? It will give you ample opportunity to use your skill and initiative and lots of pleasure.

Your local stockist will gladly supply you with the following accessory packs.

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No. 112. 1 sheet Concrete Roofing, 18½ x 11½ in.	2/- each
No. 113. Containing 12 Window and 2 Door Frames, Glazing Material to match, 3 Metal Doors	5/6 each
No. 114. Bag of Brickplayer Cement ..	1/2 each
No. 115. Bottle of Roofing Cement	6d. each

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S.H.1

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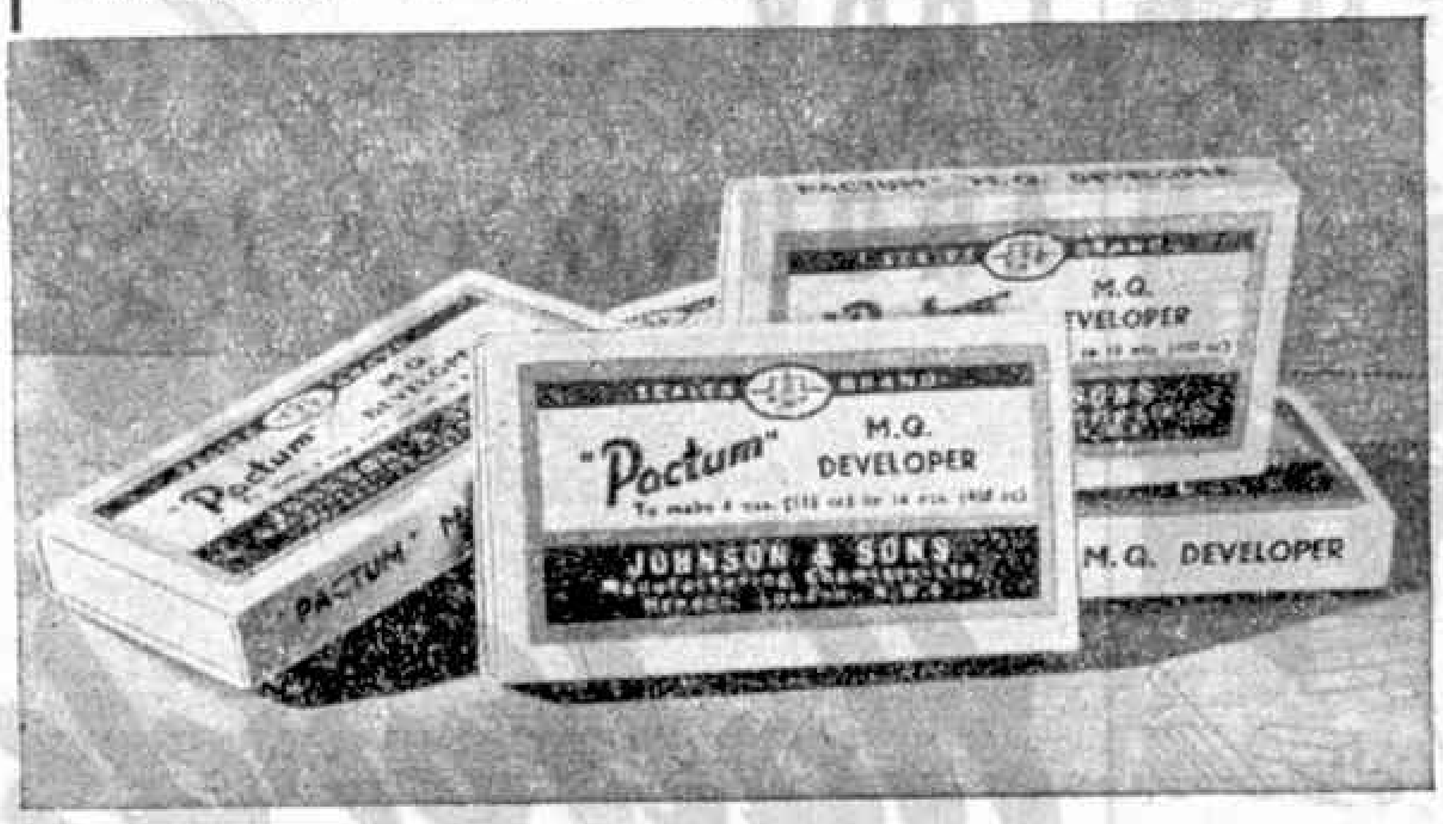

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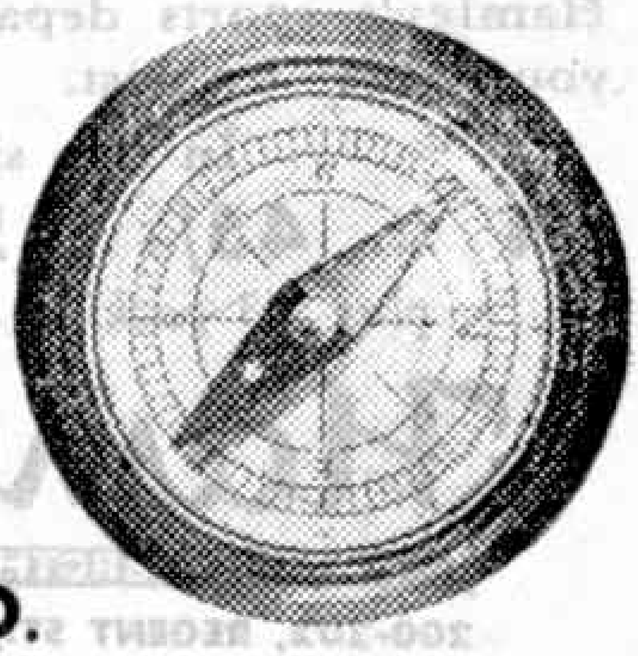

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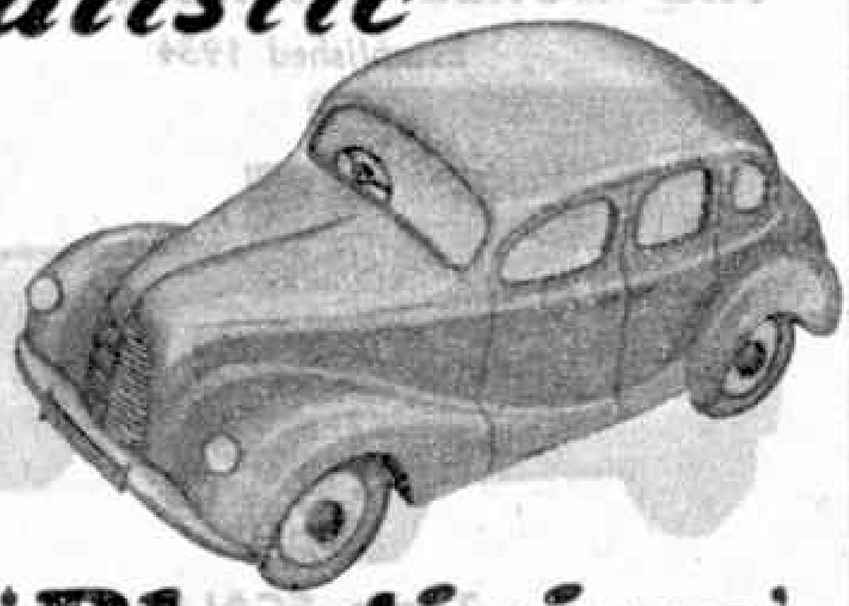

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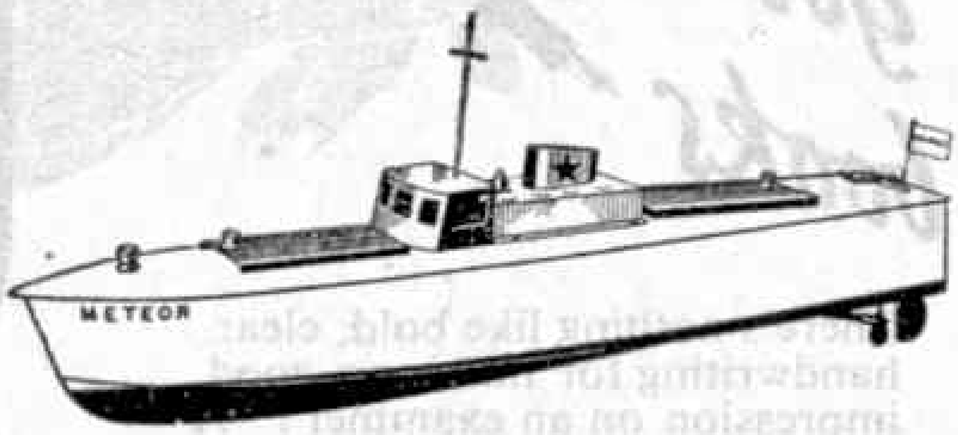

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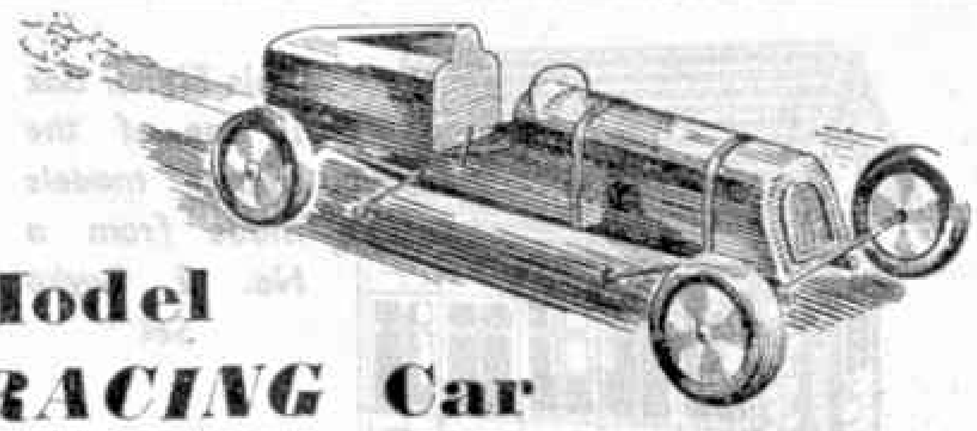

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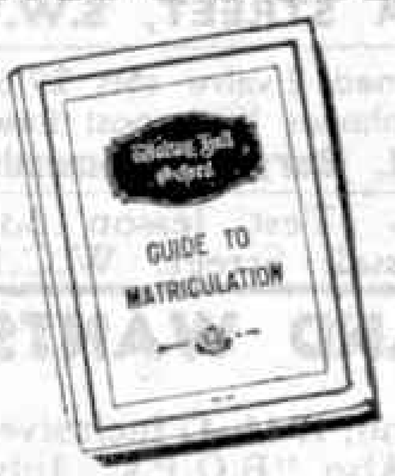

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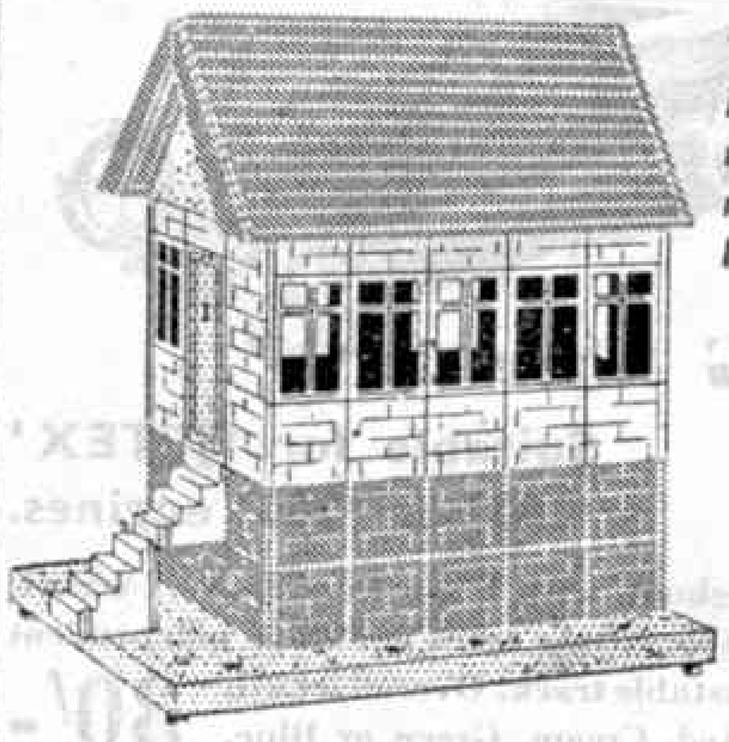

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DINKY BUILDER

The Building Toy for Younger Folks

Simplicity is the keynote of this fascinating building system. With Dinky Builder hinged plates and rods, the youngest children can build all kinds of models with the greatest ease—Furniture, Buildings, Windmills, Wheel Toys and scores of others.

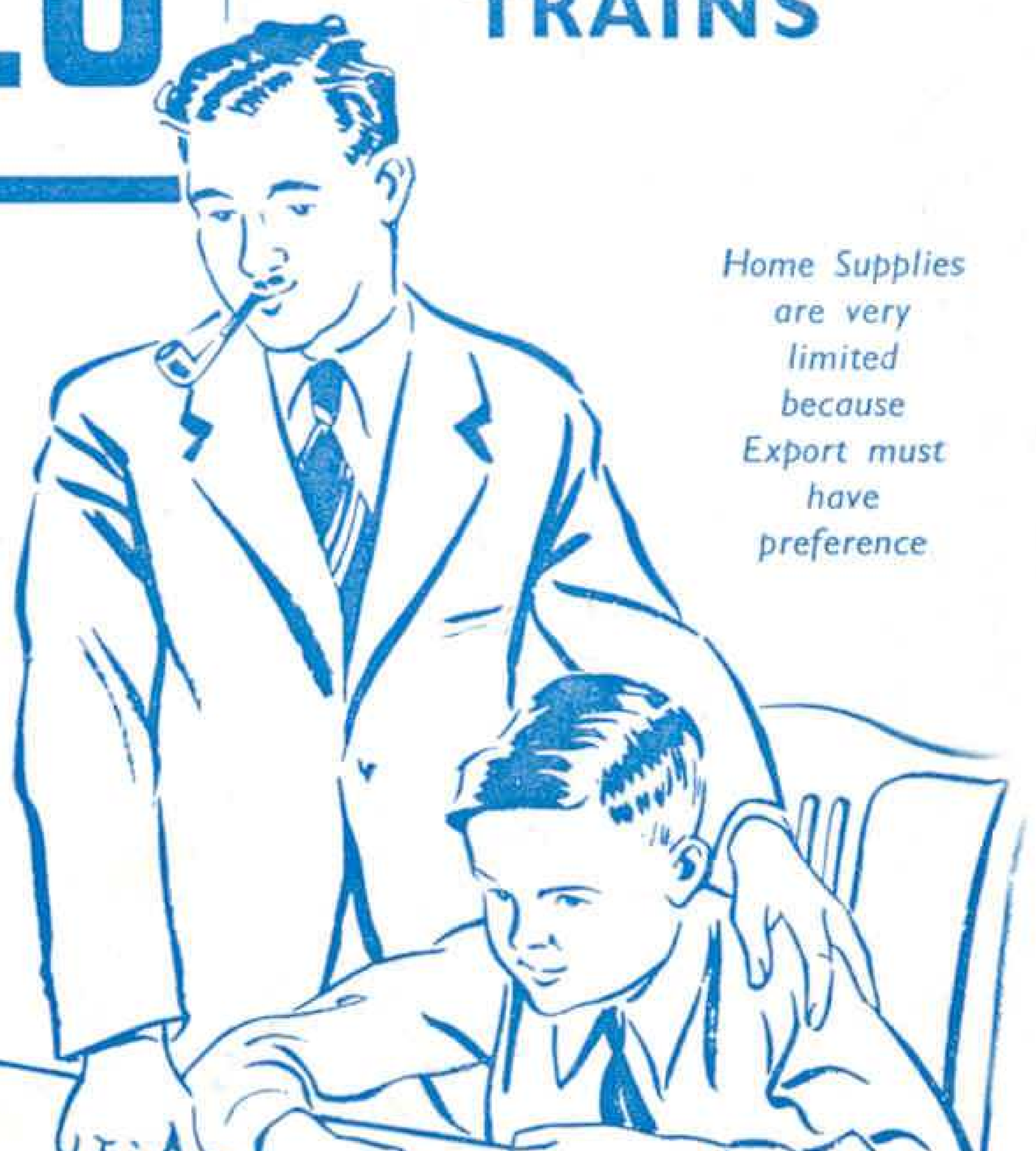
The parts are beautifully enamelled in blue and yellow. They can be used over and over again. Nuts and bolts are not used in this system.

	Price, incl. Tax
No. 1 Dinky Builder Outfit ..	**10/6**
No. 2 Dinky Builder Outfit ..	**21/-**

A No. 1 Outfit can be converted into a No. **2** Outfit by the addition of a No. 1A Accessory Outfit. .. .. Price **10/6** (incl. Tax).

MADE IN ENGLAND BY MECCANO LTD.

HORNBY DUBLO ELECTRIC TRAINS

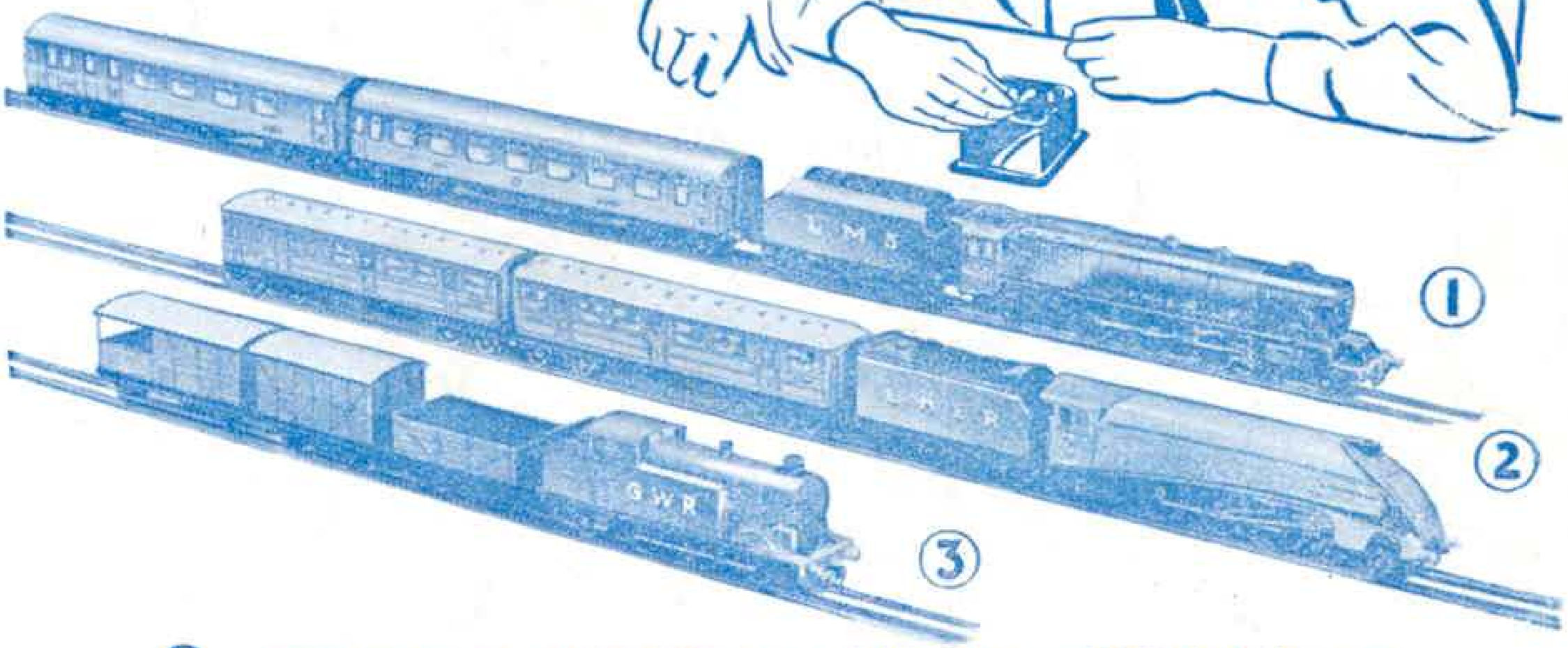


Further supplies of these fine trains will be delivered to our Dealers in the course of the next few months. Each Hornby-Dublo Electric Train set includes rails and a Hornby-Dublo Controller.

Hornby - Dublo Transformers are NOT included in the sets but are available separately, price 30/- (no tax)

Obtainable ONLY from Meccano Dealers

Home Supplies are very limited because Export must have preference



1 **EDP2 Passenger Set, L.M.S. "Duchess of Atholl." Price 157/6 (including tax)**

2 **EDP1 Passenger Set, L.N.E.R. "Sir Nigel Gresley." Price 145/- (including tax)**

3 **EDG7 Tank Goods Set, L.N.E R., L.M.S., G.W.R,, S.R. Price 125/- (including tax)**

MADE IN ENGLAND BY MECCANO LIMITED

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